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Report 197

Geology of the
Conglomerate Lake Area
District of Thunder Bay

By

S.E. Amukun

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GEOLOGICAL MAP

(back pocket)

Map 2429 (coloured)–Conglomerate Lake Area, District of Thunder Bay.
Scale 1:31 680 (1 inch to ½ mile).

CONVERSION FACTORS FOR MEASUREMENTS IN ONTARIO GEOLOGICAL SURVEY PUBLICATIONS

If the reader wishes to convert imperial units to SI (metric) units or SI units to imperial units the following multipliers should be used:

CONVERSION FROM SI TO IMPERIAL			CONVERSION FROM IMPERIAL TO SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
			LENGTH		
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709 7	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
			AREA		
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
			VOLUME		
1 cm^3	0.061 02	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.308 0	cubic yards	1 cubic yard	0.764 555	m^3
			CAPACITY		
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
			MASS		
1 g	0.035 273 96	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 75	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 62	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 908 8**	t
			CONCENTRATION		
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

1 ounce (troy)/ton (short)	20.0	pennyweights/ton (short)
1 pennyweight/ton (short)	0.05	ounce (troy)/ton (short)

NOTE–Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries published by The Mining Association of Canada in co-operation with the Coal Association of Canada.

ABSTRACT

This report describes the geology, mineral deposits, and exploration history of the Conglomerate Lake map-area, an area of approximately 260 km² located east of Lake Nipigon, about 225 km northeast of the city of Thunder Bay.

The bedrock is Precambrian in age. Much of the area is covered by Pleistocene and Recent deposits. The oldest rocks in the map-area are of Early Precambrian (Archean) age, and are composed of metavolcanics (55 percent), metasediments (10 percent), and igneous intrusive rocks (35 percent).

Figure 1–Key map showing location of the Conglomerate Lake Area. Scale 1:3 168 000.

The metavolcanics have a calc-alkaline affinity and consist predominantly of basaltic to andesitic massive, pillowed, and amygdaloidal porphyritic flows, flow- and pillow-breccias, and minor pyroclastic rocks. Felsic metavolcanics are rare. The metasediments were derived by the erosion of metavolcanics and of granitic and volcanic rocks of unknown age. The metavolcanics and metasediments are intruded by subcircular and sill-like stocks of gabbro, diorite, syenodiorite, granodiorite, and quartz monzonite. All of the Early Precambrian (Archean) rocks are cut by diabase dikes of Middle to Late Precambrian (Proterozoic) age, and have been metamorphosed under greenschist facies conditions.

The area forms part of the Wabigoon Belt within the Superior Structural Province. In much of the map-area, the metavolcanics and metasediments strike east, and have been highly deformed and tilted into units which are nearly vertically dipping. Although some primary volcanic and sedimentary structures are preserved, they are not in most cases reliable for interpretations of major structural features to be made.

The area contains anomalously high amounts of silver, copper, lead, zinc, and minor to trace amounts of gold, molybdenum, and nickel. Zinc-silver-lead-copper-gold mineralization occurs in sulphide-bearing quartz veins which are associated with lenticular felsic porphyry dikes in mafic flows; but gold also occurs in auriferous sulphide-free quartz veins in sulphide-bearing replacement quartz veins, in silicified shear zones, and granitic stocks. Details of individual properties and mineral deposits are described.

Continued exploration for base metals is recommended in the following geological environments: stratabound (formational) conductors within mafic metavolcanics for syngenetic exhalative copper-silver-gold deposits; coarse pyroclastic rocks for exhalative syngenetic massive sulphide mineralization; felsic porphyry dikes within the mafic flows for epigenetic localization of sphalerite-galena-chalcopyrite-silver mineralization; and the gabbroic-dioritic intrusions of the Crooked Green Lake, Castlewood Creek, and Boundary Intrusions for possible copper-nickel mineralization. The map-area is well situated with regard to transportation, communication, and mining facilities.

Geology
of the
Conglomerate Lake Area
District of Thunder Bay

by

S.E. Amukun[1]

INTRODUCTION

Location and Access

The central part of the Conglomerate Lake Area is located about 30 km northwest of the village of Jellicoe on the east side of Lake Nipigon. The city of Thunder Bay lies about 225 km west of Jellicoe via Highway 11 (the Trans-Canada Northern route).

Access into the map-area is provided by Highway 801 which branches in a northerly direction off Highway 11 about 9 km west of Jellicoe for 14.5 km to the "Bailey" bridge across the Namewaminikan (Sturgeon) River, where the highway ends. From here, the Auden Road, a private northerly extension of Highway 801, starts and eventually passes through the western border of the map-area *en route* to the Abitibi Power and Paper Company Camp 40 and Auden. Alternatively, the eastern part of the map-area can be reached by a private gravel road (Domtar Pulp and Paper Products Limited Camp 58 Road) which branches off Highway 11, about 3 km east of Jellicoe. This road runs northerly and then westerly through Camp 58 (now abandoned) in central Rickaby Township, and eventually to the midpoint of the eastern margin of the map-area, where it branches into the Castlewood Lake and Con Lake Roads. These roads and other subsidiary logging roads all eventually join the Mine Road which runs in an easterly direction south of Conglomerate Lake. These roads provide excellent access into most parts of the map-area. There are no lakes directly accessible by road in the map-area. Access to the south-central area is by float-equipped aircraft which can be chartered either from Jellicoe or Nakina.

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[1]Geologist, Precambrian Section, Ontario Geological Survey, Toronto. Manuscript approved for publication by the Chief Geologist, May 5th, 1978.
This report is published with the permission of E.G. Pye, Director, Ontario Geological Survey.

Conglomerate Lake Area

The map-area is approximately 260 km^2 in size, being bounded on the east and west by the eastern boundary of the Nipigon Provincial Forest Reserve, and Longitude 87°50′N, and on the south by the northern boundaries of Elmhirst and Pifher Townships and Latitude 50°00′N.

Mining Exploration Activity

The Conglomerate Lake area is situated between two mining areas that have been repeatedly prospected. The "Tashota-Onaman-Kowkash gold area" to the north was initially investigated for iron deposits in 1904, but was subsequently explored for gold and base metals in the late 1910s, early 1930s, and in the 1950s (Amukun 1977). The "Sturgeon River Gold Belt" to the south has likewise been the focus of extensive exploration activity, which started in the 1920s after gold was discovered in the Beardmore area in 1925 (Mackasey and Wallace 1978). Between 1935 and 1938, 12 355 792 ounces of gold, 575 430 cubic pounds of copper, and 14 527 ounces of silver were produced by Tashota Nipigon Mines Limited (Thurston 1976) from a mine located 6.4 km due northeast of the northeast boundary of the map-area. In the "Sturgeon River Gold Belt" to the south, 73 438 ounces of gold and 15 922 ounces of silver were produced from the Sturgeon River Gold Mine between 1937 and 1942 (Mackasey and Wallace 1978); 2460 ounces of gold and 1558 ounces of silver worth $86 756 (1935 prices) were also produced at the Orphan Mine between 1934 and 1935 (Mackasey and Wallace 1978). In addition, a total tonnage of 250 600 tons of silver-zinc mineralization at a weighted average grade of 1.32 ounces per ton of silver and 4.44 percent zinc was reported by Thurston (1976, p.52) for the Headway Red Lake Gold Mines deposit 3 km to the north, and 937,538 tons of 0.42 percent copper, and 0.41 percent nickel were also outlined in the area 0.8 km south of the south-central boundary of the map-area (Mackasey and Wallace 1978).

Following the discovery of gold and base-metal prospects in the surrounding country, prospecting and staking activity spread into the map-area. Several gold and base-metal prospects were discovered in the Conglomerate Lake Area, and some of these have been re-examined sporadically since the early 1900s.

Recent exploration surveys including diamond drilling, geophysical surveys, and geological-geochemical methods in search of additional base-metal deposits have been conducted on the northeastern border and in the area immediately north and northeast of the map-area.

Previous Geological Studies

Previous geological studies of T.L. Gledhill (1925) and L.F. Kindle (1931) which involved the northern part of the map-area were mostly of a reconnaissance nature. The map-area was included in the detailed mapping of the South Onaman Area (Moorhouse 1938). Some of the rock units outlined by the detailed mapping of the Onaman area (western half) immediately to the north (Thurston 1976) and of Elmhirst and Rickaby Townships (Mackasey and Wallace 1978) ex-

tend into the current map-area.

Numerous brief summaries of the geology of individual claim groups are presented in geophysical and geological reports of various companies to which the interested reader should refer (Assessment Files Research Office, Ontario Geological Survey, Toronto).

A generalized geology of the map-area is available on a 1 inch to 4 miles (1:253 440) geological compilation map (Map 2102) published by the Ontario Department of Mines (Pye *et al.* 1966). Aeromagnetic maps are also available at a scale of 1 inch to 1 mile (1:63 360) and 1 inch to 4 miles (1:253 440) as Maps 2136G (North Wind Lake) and Map 7102G (Longlac) respectively (ODM-GSC 1963; 1965). Four high resolution aeromagnetic maps (20105G, 20106G, 20109G, and 20110G) flown in 1971, show the results of the survey of the map-area (ODM-GSC 1974a,b,c, and d).

Present Geological Studies

The field work for this report was conducted in the summer of 1976. The area was mapped by pace-and-compass traverses that were planned to cross the regional structural trend at right angles, at suitable intervals, and where possible to pass between distinct topographic features. The traverses were supplemented by examining outcrops along the major creeks, rivers, and edges of lakes, and along the numerous logging roads that criss-cross most of the map-area. In the south-central area, where insufficient outcrops were indicated on the aerial photographs, all the outcrops spotted from aerial photographs, or indicated on Map No.47h (Moorhouse 1938) were examined. Airphotographs and aeromagnetic maps were utilized to interpret outcrops and diabase dike extensions that were not actually examined.

The geological field data were plotted on acetate overlay sheets on vertical aerial photographs and then transferred to the cronaflex base maps provided by the Cartographic Section of the Surveys and Mapping Branch, Lands Division, Ontario Ministry of Natural Resources. The photographs and the base maps are at the same scale of 1:15 840. The photographs were taken in 1962 and 1975. More recent air photographs of parts of the area were made available by the District Office of the Ontario Ministry of Natural Resources at MacDiarmid. The base maps were derived from the Forest Resources Inventory Maps (FRI) of the Surveys and Mapping Branch. Minor topographic revisions were made on the base map by the author and his assistants.

In March 1977, uncoloured preliminary maps P.1236 and P.1237 of the map-area were published by the Ontario Geological Survey at a scale of 1:15 840 (Amukun *et al.* 1977a, 1977b).

All granitic rock samples collected were stained in the field using a variation of F. Chayes's (1952) method in which the rocks were first immersed in dilute hydrochloric acid (to eliminate excess carbonates) before being etched with hydrofluoric acid and stained with cobaltinitrite (Solar *et al.* 1972). Some selected typical and crucial rock samples were sectioned for microscopic studies and some of these were submitted for chemical analyses and assays which were done by rapid methods at the Geoscience Laboratories, Ontario Geological Survey.

Acknowledgments

John Jansen, as senior assistant, was responsible for the independent mapping of approximately 50 percent of the area. Additional mapping was provided by Gary Lawrence, who with John Atkins and Patrick Collins acted as junior assistants.

The author gratefully acknowledges the logistic aid provided by K.G. Fenwick in his capacity as Regional Geologist at Thunder Bay. John Scott, assistant to the Regional Geologist, took a number of the photographs accompanying the report. Rick Rutledge and Dave Millard of the Lynx-Canada-Dejour-Canadian Reynolds Syndicate contributed helpful discussions on the geology, mineral deposits, and current surveys of their property.

The author and his assistants are indebted to William Miron of Rickaby Mines Limited for permission to use their field trailer camp in Rickaby Township as a field base camp.

Topography and Drainage

The relief of the Conglomerate Lake area is monotonously low. The highest elevation in the area lies west of Crooked Green Lake, and does not exceed 100 m above the general level of the surrounding country. Most of the prominent elevations in this area are drift hills, but in the northwest corner of the map-area, some outcrops of diabase form hills that rise as high as 30 m above the granitic, gabbroic, and metavolcanic outcrops.

The Conglomerate Lake area contains a few sizeable lakes, but these lakes are confined to the northern and southern parts of the map-area. Between Castlewood and Crooked Green Lakes to the south and Conglomerate Lake to the north, no lakes of any size occur. This area is drained by Con and Castlewood Creeks which are meandering streams that almost define lithological contacts. The northern part of the area is drained by the Onaman River which also almost parallels the metavolcanic-metasedimentary contact. The drainage of the southern part of the area is controlled by Crooked Green and Fairview Creeks which drain southerly from Crooked Green Lake and the Fairview Olson-Calvert-Hindson Lake System respectively. Pinel Creek drains Wedlock, Pinel, and Dougall Lakes; it eventually empties its waters into Wilkinson Lake on the Elmhirst-Rickaby Township border.

Natural Resources

The Conglomerate Lake area was heavily wooded with forest growth of spruce, jackpine, poplar, birch, and balsam in 1938 (Moorhouse 1938, p.3). In recent years, much of the timber in the map-area has been harvested by the lumbering operations of the Abitibi Power and Paper Company and the Domtar Pulp and Paper Products Limited with the consequence that the 1962/1975 air

photographs were of little use for planning the traverses. The swampy and low (muskeg) areas with black spruce, tamarack, and cedar were not much changed.

Almost all the sizeable lakes in the map-area are shallow and sandy, and have not been reported to contain major fish populations. Reasonably-sized trout, pickerel, pike, and white fish, however, have been reported from the Onaman River, Conglomerate Lake, and also from Martin Creek which is just outside the northwest margin of the map-area.

Large land animals that were seen in the field included moose and bear. Small animals observed include: beaver, skunk, squirrel, and weasel. The birds of the area include partridge, grouse, duck, loon, goose and the occasional black hawk, blue heron, and grey jay.

GENERAL GEOLOGY

Except for swarms of Middle to Late Precambrian (Proterozoic) diabase dikes, the bedrock is entirely of Early Precambrian (Archean) age, and is composed of metavolcanics (55 percent), metasediments (10 percent), and intrusive rocks (35 percent). The Early Precambrian rocks of the Conglomerate Lake area lie between the east-trending Geraldton-Beardmore Metavolcanic-Metasedimentary Belt, (see Map 2102, Pye *et al.* 1966) to the south, and the east-trending Tashota-Onaman Metavolcanic Belt (Pye *et al.* 1966) to the north. These belts are grouped together into the Wabigoon Belt (Goodwin 1970; Mackasey and Wallace 1978), which is a major subdivision of the Superior Province of the Canadian Shield.

The Conglomerate Lake metavolcanics are predominantly of basalt to andesite composition with only a minor amount of felsic metavolcanics. The metavolcanics mainly comprise massive, pillowed, and amygdaloidal porphyritic flows, flow- and pillow-breccia, and minor pyroclastic rocks, which have been highly altered by carbonatization, cataclasis, and metamorphism. Carbonatization is extensive, appears to be the principal type of alteration, and gives rise to white weathered surfaces in most of the mafic to intermediate metavolcanics. The minor felsic metavolcanics, also severely altered, occur mainly astride the southern border of the map-area, and as narrow pyroclastic (tuff) bands intercalated with the mafic to intermediate metavolcanics. Extensive, and thick successions of intermediate to felsic coarse pyroclastic rocks are reported by W.O. Mackasey and H. Wallace (1978) south of the map-area, and P.C. Thurston (1976) reported a narrow belt of these rocks to the north of the map-area, but this rock type is not common in the map-area.

A well-defined, but narrow clastic metasedimentary belt lies within the metavolcanics, astride the Onaman River System and Con Creek. The clastic metasedimentary unit appears to be locally derived. A typical unit is made up of a polymictic, clast-supported, pebble to cobble conglomerate, with a variable matrix (sand, mud, or chloritic material), intercalated with thin beds of feldspathic wacke, arkosic wacke, mudstone, and tuff. At a point just south of MacDonald Lake, the trend of the metasedimentary unit changes abruptly from being parallel to the Onaman River System which trends northeasterly, to a parallelism with Con Creek which trends northwesterly. Several narrow beds of green, fine-

grained rocks interpreted to be mudstone are interbedded with the metavolcanics in the area south of Conglomerate Lake and south and southwest of Con Lake.

In the Conglomerate Lake area, the intrusive rocks form roughly circular bodies and are mainly composed of intermediate intrusions of gabbro and diorite with local quartz-rich varieties that form 30 percent, and felsic granitic bodies of granodiorite to quartz monzonite form 5 percent of the map-area. Gabbroic to dioritic rocks occur as four intrusions and also form sills and dikes of unknown age that cut the metavolcanics. The intrusions, herein named the Castlewood Creek, Crooked Green Lake, South Onaman, and Boundary Intrusions may represent the upper contact phases of underlying masses of batholithic "granites", as yet unexposed by erosion. The gabbro body north of the Onaman River does not appear to be related to the other three intrusions and may be older than them.

There are two bodies of granitic rocks within the map-area. The stock bordering the northeast edge of the area is part of a larger batholith that lies west of Onaman Lake (Thurston 1976, p.36). A smaller but similar boss of quartz monzonite outcrops west of Con Creek, just south of the Mine Road. A few outcrops of granitic rock which occur north of Conglomerate Lake may constitute part of a larger stock around Brennan Lake reported by Thurston (1976). Several outcrops of a previously unmapped but possibly more extensive quartz monzonite intrusion occur on the Auden Road on the northwest border of the map-area.

Late diabase dikes postdate granitic intrusions and cross-cut all other rocks in the area. Some of these dikes form conspicuous ridges and the major dikes are porphyritic, the typical "greenspar".

The Precambrian bedrock is covered by extensive glacial and glaciofluvial Pleistocene deposits.

Table 1 presents all the lithologic units mapped in the map-area.

Precambrian

EARLY PRECAMBRIAN (ARCHEAN)

Metavolcanics and Metasediments

METAVOLCANICS

The metavolcanics are of calc-alkaline affinity and consist predominantly of mafic to intermediate rocks (80 percent) and minor intermediate to felsic rocks (20 percent). True felsic metavolcanics are rare. The metavolcanics were deposited under subaqueous and subaerial conditions. A total of forty five samples of the metavolcanics were cut for thin sections, twenty two of these were submitted

TABLE 1 | **TABLE OF LITHOLOGIC UNITS FOR THE CONGLOMERATE LAKE AREA.**

PHANEROZOIC

CENOZOIC

QUATERNARY

RECENT

Fluvial, lacustrine, and swamp deposits

PLEISTOCENE

Sand, gravel, clay, silt, and sandy till

Unconformity

PRECAMBRIAN

MIDDLE TO LATE PRECAMBRIAN (PROTEROZOIC)

MAFIC INTRUSIVE ROCKS

Diabase, porphyritic diabase

Intrusive Contact

EARLY PRECAMBRIAN (ARCHEAN)

INTERMEDIATE TO FELSIC IINTRUSIVE ROCKS

Quartz monzonite, granodiorite, trondhjemite, quartz diorite, quartz-feldspar porphyry; feldspar porphyry, felsite, aplite, pegmatite, granitic dikes, agmatite, intrusive breccia, hybrid intrusive rocks, hornblende and biotite-rich rocks

Intrusive Contact

MAFIC TO INTERMEDIATE INTRUSIVE ROCKS

Gabbro, quartz gabbro, diorite, quartz diorite, syenodiorite, syenite, granodiorite, agmatite, lamprophyre, intrusive breccia

Intrusive Contact

METAVOLCANICS AND METASEDIMENTS

METASEDIMENTS

Conglomerate, feldspathic wacke, arkosic wacke, arenite subarkose, mudstone, graphite schist, iron formation, sandstone, chert, reworked tuff

INTERMEDIATE TO FELSIC METAVOLCANICS

Tuff, lapilli-tuff, tuff-breccia, pyroclastic breccia, agglomerate, crystal tuff, quartz porphyry, feldspar porphyry, lapillistone, felsite, chlorite schist, sericite schist

MAFIC TO INTERMEDIATE METAVOLANICS

Amygdaloidal, and vesicular flow, coarse-grained flows, and pillow lava, pillow and flow breccia, agglomerate, tuff, lapilli-tuff, tuff-breccia, pyroclastic breccia, crystal tuff, chlorite schist, porphyritic feldspar porphyry, feldspar porphyry, recrystallized flows, garnetiferous rocks, massive rocks, amphibolite, hornblende schist

for complete chemical analyses, and twenty three were also submitted for partial chemical analyses.

Mafic to Intermediate Metavolcanics

These rocks range in composition from basalt to andesite (up to 58 percent SiO_2), are the predominant rocks throughout the map-area, and account for over 50 percent of all outcrops. Some primary textural and structural features are still preserved and these facilitate the identification of the metavolcanics.

In the field most of the metavolcanics are highly altered by carbonatization, cataclasis, and metamorphism. Carbonatization is extensive, appears to be the principal type of alteration, and produces white weathering in most metavolcanic outcrops. Microscopic examination of a typical thin sectioned specimen of carbonatized metavolcanic rock reveals that carbonate occurs randomly in amounts up to 10 percent. It is difficult to ascribe all of the white weathering to carbonate alteration. Other predominant types of alteration include: a) intense local cataclasis and/or dynamothermal metamorphism which have destroyed original volcanic features and given rise to silicified, schistose, amphibolitic, and chloritic schists; and b) recrystallization which has modified grain size and texture to produce coarse-grained (gabbroic-looking) rocks, the origin of which could occsionally be inferred by the field party.

The mafic to intermediate metavolcanics range from basalt to andesite and have silica (SiO_2) contents from 46.1 to 58.1 percent, and are described in the following sections.

Flow Lava

Most of the lavas are pillowed, retaining ellipsoidal pillow structures of variable size (Photo 1). In most exposures observed by the field party, shearing has modified pillow shape so much that top determinations cannot be obtained. Some of the pillows display light, epidotized cores. Porphyritic flows are common, and these are composed of anhedral to subhedral metacrysts of altered plagioclase ($An<10$). The original grain size of the flows is difficult to interpret in some outcrops because of the extensive alteration and shearing. The metavolcanics range from fine to coarse grained throughout the map-area. In the absence of primary structures, coarse-grained flows cannot be distinguished from gabbroic intrusive rocks. A typical pillow lava sample is dominantly hornblendic (and/or chloritic) and feldspathic in composition, dark grey in colour, and is fine to medium grained in size. Thin section examination of typical basaltic and andesitic rocks reveals that pilotaxitic and diabasic textures are preserved in some thin sections, and that the specimens are composed of hornblende (or cummingtonite), plagioclase (labradorite?), chlorite, biotite, clinozoisite/saussurite, carbonate, magnetite, sphene, epidote, quartz, and muscovite.

In the more altered rocks only a few laths of plagioclase are preserved, and the matrix is a fine, granular quartzofeldspathic mozaic containing quartz, felds-

OGS 10 099

Photo 1–Pillow lava with ovoid structure, from outcrops along Crooked Green Lake Road.

par, sericite, chlorite, biotite, and epidote. The pillow selvages are represented by aphanitic, cryptocrystalline grains of quartz(?) and chlorite.

Amygdaloidal flows were examined at outcrops on the large island in Castlewood Lake. These rocks are interlayered with pillowed zones, and only occur at this locality in the map-area. These rocks are hard because of silicification, vary from being fine to medium grained, and are dark green to light grey. Except for the quartz and calcite filled amygdules 1 to 6 mm in diameter, amygdaloidal flows are megascopically and microscopically similar to pillow lava.

A distinct unit of grey green fine-grained rock, possibly a pillow-breccia is readily identifiable in the area along and north of the Fairview Lake Road. The pillows are ellipsoidal to irregular in shape, and are elongated in size from 1 to

OGS 10 100

Photo 2–Fragmental structure in pillow breccia unit, Fairview Lake road (Photo by John Scott).

1.5 m in their longer dimension. The breccia comprises light-weathering, randomly distributed pillow fragments which constitute between 10 and 50 percent of the rock (Photo 2, see also photo on p.7 in Moorhouse (1938)) and are set in a chloritic and feldspathic matrix. In some cases, these light-weathering pillow fragments are surrounded by dark, narrow, and fine-grained selvages, and in some of them epidotized cores and elongated amygdules rimming the convex tops are common. When examined in thin section, these rocks display a granular texture with subhedral to euhedral and randomly oriented grains of hornblende, plagioclase, and epidote in a groundmass of plagioclase, biotite, chlorite, quartz, sericite, and epidote. Pyroxene pseudomorphs consisting of epidote, chlorite, and biotite were recognized in a few specimens. The pillow fragments have less hornblende and are composed predominantly of plagioclase and epidote grains that are interspersed in a fine-grained interwoven groundmass of unidentifiable microlites.

Chemical analyses of flow lava are listed in Table 2, p.14. The locations of analyzed specimens are given on Map 2429, back pocket.

Massive lava, where primary volcanic flow structures are not recognized, occurs throughout the map-area.

These rocks are interpreted to be lavas, because in the field they generally separate flow lava outcrops and are assumed to: 1) represent centres of thick flow units; and 2) delineate flow tops. Where outcrops of these rocks are separated

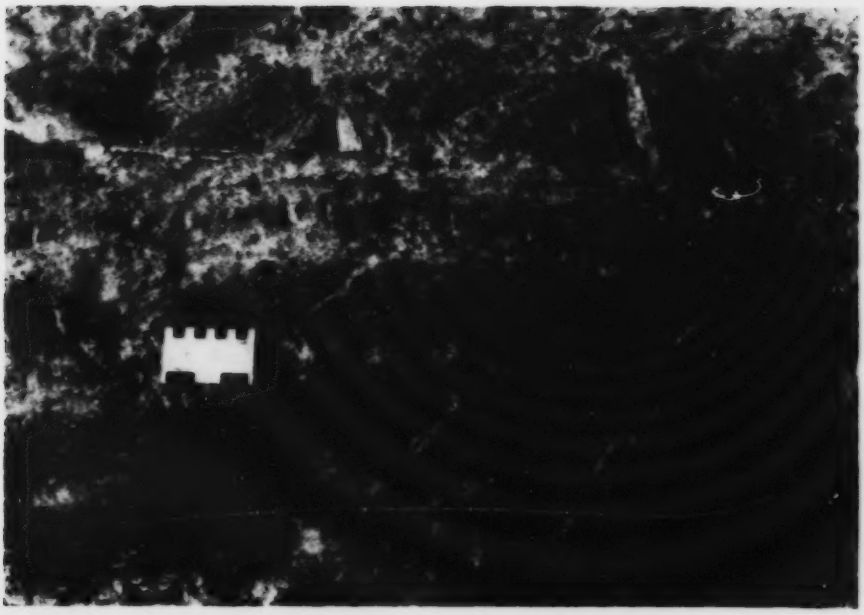

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Photo 3–Pronounced compositional banding in mafic tuff in outcrops on the road connecting Castlewood Lake and the Mine roads.

from one another, it is often difficult, even after thin section studies, to determine their origin. Some of these rocks could indeed be intrusive. In outcrop, these rocks are dark green to grey, vary from fine to coarse grained, and are usually massive to slightly foliated. Petrographic studies show that these rocks resemble the pillowed flows except for the absence of flow textures and structures.

Pyroclastic Rocks

The mafic to intermediate tuffs are interflow units ranging in thickness from a few to several hundred metres. In outcrop, the tuffs are grey-green and display a brownish tint. Bedding is usually evident. On outcrop surfaces on the road joining Castlewood Lake and the Mine Roads, as in most outcrops of the northeast part of the map-area, compositional banding is pronounced (Photo 3). The bedding is made up of chloritic - hornblendic, and feldspathic layers 1 to 5 cm thick in which a few visible lapilli-size fragments are scattered. In other areas, the bedding is composed of alternate aphanitic to fine- and medium-grained layers of dark chlorite and hornblende-rich layers of nearly the same thickness. In

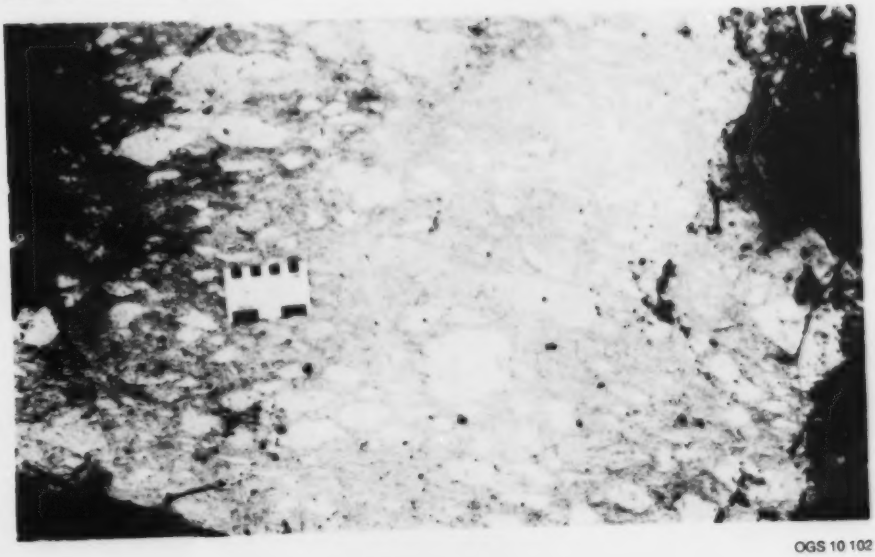

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Photo 4–Mafic tuff-breccia from outcrops north of Calvert Lake. Dacitic (light) fragments are in a mafic matrix.

thin section, banded tuffs are very fine grained and consist of mineralogical bands. These bands are composed of subhedral hornblende (60 percent), with feldspar (25 percent), and epidote (15 percent). Chlorite, carbonate, biotite, quartz, sphene, and opaque minerals are minor components. The lapilli fragments consist of quartz and feldspar metacrysts and mafic, intermediate, and felsic metavolcanics. Crystal tuffs, in which a majority of the lapilli material are recognizeable crystal fragments occur in hand specimen and in thin section.

Lapilli-tuff, tuff-breccia, and pyroclastic breccia constitute approximately 5 to 10 percent of the mafic metavolcanics. The coarse mafic pyroclastic rocks are readily distinguished from the pillow-breccia unit, because unlike the brecciated flow units, they are composed of coarse rock fragments. The bombs are ellipsoidal to irregular in shape, and are derived from mafic, intermediate, and felsic metavolcanics. The bombs constitute up to 80 percent of the rock and are emplaced in a greenish chloritic and schistose matrix which generally makes up 30 percent of the rock (Photo 4). In thin section, the coarse pyroclastic rocks consist of a fine-grained chloritic matrix which contains subhedral feldspar laths and accessory quartz, epidote, biotite, and carbonate in which fragments are set. The fragments vary in size from that of lapilli to bombs, and in amount from 30 to 80 percent respectively. Most of the fragments are composed of quartz, feldspar, and amphibole, with minor carbonate, chlorite, epidote, muscovite, sphene, and possible quartz-filled amygdules.

Chemical analyses of mafic to intermediate pyroclastic rocks are listed in Table 2 and names are given in Table 3. All field locations of the specimens are plotted on Map 2429, back pocket.

Mafic to Intermediate Rocks of Unknown Origin

In the map-area, there are numerous outcrops of feldspar porphyry (1w) in which flow or pyroclastic features are lacking, probably because they have been destroyed by recrystallization and/or shearing. Thin section studies of these rocks reveal subhedral metacrysts of altered plagioclase (An_5 to An_{10}) up to 1 cm long. Smaller subhedral patches of sericite, chlorite, epidote, biotite, plagioclase, quartz, and amphibole are present.

Gabbroic-looking massive rocks, (1y) without flow or pyroclastic structures and textures, but which are spatially associated with the pillowed and porphyritic metavolcanics, occur in the map-area. Although some of these rocks were interpreted to be recrystallized mafic metavolcanics, these rocks may in part be intrusive in origin. In thin section, these rocks are revealed to consist of phenocrysts of hornblende (about 2 mm in size) set in a groundmass of saussuritized and sericitized plagioclase, epidote, and accessory chlorite, biotite, sericite, and opaque minerals. In the adjacent area to the north, the coarse-grained rocks were originally designated as recrystallized mafic metavolcanics (Thurston 1976, p.13). After thin section and chemical studies, P.C. Thurston (1976, p.13) reinterpreted these rocks to be high-magnesian basalts. The rocks are difficult to distinguish from the concordant intrusive metagabbro because they differ only in the grain size, and in the degree of alteration.

Intermediate to Felsic Metavolcanics

This group of rocks ranges in composition from andesite to rhyolite (Table 2) and accounts for 20 percent by area of all metavolcanics in the map-area. These rocks are almost exclusively made up of pyroclastic units. The main occurrence of intermediate to felsic metavolcanics in the map-area comprises a unit about 1.6 km wide and occurs along the entire southern border, except where it has been intruded by the gabbro-diorite outcrops of the Boundary Intrusion (see section on "Intrusive Rocks"). This unit consists of coarse pyroclastic rocks, a northern extension of the thick sequence which underlies the northwestern corner of Elmhirst Township (Mackasey and Wallace 1978). The narrow unit of felsic metavolcanics reported by Thurston (1976, p.16) might extend into the northeast part of the map-area, under the extensive Pleistocene deposits. Several dikes of quartz and feldspar porphyry and felsite cut across the mafic metavolcanics throughout the map-area, but most especially in the northeast part.

TABLE 2a COMPLETE CHEMICAL ANALYSES OF SOME METAVOLCANICS FROM THE CONGLOMERATE LAKE AREA. SAMPLE LOCATIONS ARE GIVEN ON MAP 2429, BACK POCKET. NOTE ONLY NUMERICAL NUMBERS OF THE SPECIMEN ARE PLOTTED IN FIGURES 3a and 3b. CHEMICAL ANALYSES BY GEOSCIENCE LABORATORIES, ONTARIO GEOLOGICAL SURVEY.

Major Components in Weight Percent

Sample Number	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O^+	H_2O^-	CO_2	TiO_2	P_2O_5	S	MnO	Total
6A-24-2	78.65	12.4	0.30	0.77	2.23	0.01	0.00	3.55	1.34	0.55	0.10	0.09	0.04	0.01	0.03	100.0
6A-24-2D	78.05	12.3	0.30	0.77	2.23	0.00	0.00	3.55	0.14	0.53	0.10	0.09	0.04	0.01	0.03	99.1
6A-748	52.5	17.8	2.85	6.37	5.82	5.29	4.45	0.47	2.10	0.58	0.17	0.94	0.19	0.02	0.15	99.7
6A-656-1	81.65	10.7	0.16	0.21	0.11	0.32	4.79	1.12	0.06	0.30	0.10	0.12	0.06	0.01	0.01	99.7
6A-722-1	49.8	17.6	2.08	8.40	6.37	9.32	3.46	0.24	0.95	0.48	0.10	0.86	0.09	0.02	0.18	100.0
6A-722-1D	49.7	17.5	2.23	8.25	6.41	9.33	3.17	0.24	0.94	0.45	0.10	0.86	0.09	0.02	0.18	99.5
6A-1197-1	53.6	16.5	2.22	7.28	5.18	8.52	3.85	0.23	0.29	0.50	0.11	0.94	0.19	0.01	0.15	99.6
6A-13	55.5	16.6	2.36	5.04	3.30	5.89	2.76	1.61	2.34	0.56	2.36	0.70	0.11	0.03	0.12	99.3
6A-16	48.6	15.3	3.40	7.21	7.41	11.7	1.80	0.13	1.72	0.49	0.32	0.80	0.09	0.05	0.19	99.2
6A-24-1	48.1	15.6	2.10	7.84	8.46	11.7	1.64	0.18	2.21	0.47	0.10	0.71	0.08	0.03	0.20	99.4
6A-553	49.0	16.3	2.90	7.84	5.90	12.3	1.55	0.27	1.63	0.41	0.12	0.83	0.08	0.01	0.25	99.4
6A-556	46.1	16.2	3.07	7.14	9.08	11.9	1.18	0.01	2.69	0.46	0.11	0.61	0.08	0.02	0.18	98.8
6A-687-1	59.8	16.1	1.59	4.90	3.42	3.32	5.00	0.82	1.92	0.51	1.63	0.79	0.16	0.02	0.10	100.1
6A-695-1	57.2	15.5	2.09	5.46	4.37	6.07	3.37	0.18	2.16	0.50	1.67	0.77	0.17	0.01	0.10	100.1
6A-46-1	54.7	17.2	3.32	4.41	4.24	8.37	3.71	0.61	1.90	0.57	0.16	0.77	0.20	0.01	0.12	100.3
6A-638-1	58.8	16.2	2.37	4.20	3.76	5.57	4.12	0.35	1.86	0.55	1.58	0.63	0.20	0.01	0.09	100.5
6A-1119-1	51.9	18.3	1.89	8.75	4.31	7.71	4.17	0.41	0.80	0.59	0.14	1.06	0.10	0.01	0.27	100.4
6A-1151-2	48.6	15.1	2.28	9.66	6.57	12.0	1.48	0.13	1.70	0.54	1.02	0.79	0.08	0.01	0.28	100.2
6A-99-1	51.0	11.9	2.22	9.80	10.2	10.2	0.61	0.15	3.10	0.39	0.47	0.51	0.07	0.01	0.20	100.8
6A-5	56.1	16.2	2.66	6.15	2.49	7.19	3.01	0.51	2.78	0.37	1.88	0.32	0.21	0.01	0.19	101.6
6A-8	58.5	16.6	1.90	4.06	2.77	7.32	4.06	0.56	1.67	0.42	1.93	0.85	0.20	0.01	0.11	101.0
6A-2-1	55.9	15.8	1.39	4.62	4.82	6.36	5.81	0.57	2.07	0.39	2.48	0.72	0.17	0.01	0.11	101.2
6A-7-2	60.0	17.0	1.78	5.95	2.33	2.27	5.63	0.68	2.23	0.46	0.40	0.99	0.19	0.02	0.10	100.0

TABLE 2b PARTIAL CHEMICAL ANALYSES OF SOME METAVOLCANICS FROM THE CONGLOMERATE LAKE AREA. SAMPLE LOCATIONS ARE GIVEN ON MAP 2429, BACK POCKET. NOTE ONLY NUMERICAL NUMBERS OF THE SPECIMEN ARE PLOTTED IN FIGURE 3a and 3b. CHEMICAL ANALYSES BY GEOSCIENCE LABORATORIES, ONTARIO GEOLOGICAL SURVEY.

Major Components in Weight Percent

Sample Number	SiO_2	Al_2O_3	Total FeO as	Fe_2O_3	MgO	CaO	Na_2O	K_2O	H_2O^+	H_2O^-	CO_2	TiO_2	P_2O_5	S	MnO	Total
6A-560-3	43.9	12.5	8.13	—	7.24	11.5	2.76	0.23	12.1	—	—	0.72	0.57	—	0.2	99.9
6A-024-1	57.6	16.7	7.60	—	2.97	6.07	4.56	0.17	2.91	—	—	0.84	0.21	—	0.12	99.8
6A-1109-5	51.2	16.8	10.3	—	5.46	4.94	4.72	0.15	6.11	—	—	0.97	0.14	—	0.18	101.0
6A-103-2	52.2	18.3	8.23	—	4.04	11.9	2.77	0.62	1.59	—	—	0.88	0.26	—	0.14	100.9
6A-593	51.2	16.4	9.02	—	5.25	7.15	4.27	0.43	5.99	—	—	0.86	0.19	—	0.15	100.9
6A-1109-2	56.4	16.6	7.73	—	4.12	7.59	3.36	0.25	2.87	—	—	0.74	0.15	—	0.12	99.9
6A-632-1	54.6	16.3	8.46	—	5.17	7.44	3.63	0.38	3.11	—	—	0.79	0.18	—	0.13	100.2
6A-632-1D	55.0	16.3	8.44	—	5.14	7.44	3.89	0.38	3.03	—	—	0.80	0.17	—	0.13	100.7
6A-29-2	46.1	19.3	19.4	—	5.83	0.51	1.54	0.83	5.35	—	—	1.47	0.12	—	0.28	100.7
6A-579-1	53.2	15.9	9.47	—	5.38	7.10	3.93	0.28	3.35	—	—	0.89	0.17	—	0.14	99.8
6A-1110-1	51.1	15.1	10.4	—	4.88	8.56	3.34	0.03	5.95	—	—	0.93	0.22	—	0.18	100.7
6A-1120-1	50.0	14.8	17.1	—	6.52	7.42	2.52	0.20	0.24	—	—	1.11	0.10	—	0.30	100.3
6A-578-1	56.0	15.5	9.60	—	4.89	5.96	3.71	0.42	2.79	—	—	0.79	0.17	—	0.19	100.0
6A-624-1	56.3	17.0	8.66	—	3.89	5.06	4.50	0.18	3.03	—	—	0.87	0.20	—	0.14	99.8
6A-630-1	54.9	15.7	9.71	—	6.17	8.24	1.73	0.03	4.31	—	—	0.79	0.17	—	0.18	100.9
6A-616-2	58.8	14.2	7.14	—	3.98	5.51	4.10	0.38	5.43	—	—	0.73	0.18	—	0.15	100.7
6A-637-1	57.6	16.9	8.30	—	3.14	6.28	3.94	0.23	3.47	—	—	0.75	0.18	—	0.12	100.9
6A-103-1	45.8	16.6	12.9	—	7.92	10.9	0.00	0.34	4.31	—	—	1.34	0.28	—	0.20	100.6
6A-616-1	52.3	14.6	11.4	—	6.85	4.98	2.37	0.29	6.59	—	—	0.80	0.20	—	0.22	100.6
6A-002-1D	58.1	16.2	7.82	—	5.66	3.25	5.41	0.42	2.55	—	—	0.70	0.16	—	0.12	100.4
6A-654-2	48.2	15.8	12.9	—	6.60	8.17	1.37	0.07	6.19	—	—	0.85	0.09	—	0.17	100.4
6A-128-1	60.5	16.7	6.96	—	2.61	5.27	4.22	0.73	1.91	—	—	0.78	0.21	—	0.13	100.0
6A-135-1	61.7	16.0	6.56	—	3.52	5.19	2.64	1.66	1.67	—	—	0.71	0.16	—	0.09	99.8
6A-129-3	63.9	15.7	4.86	—	1.75	4.78	4.46	1.32	2.19	—	—	0.77	0.18	—	0.08	100.0

TABLE 3 | FIELD NAMES AND EQUIVALENT NAMES AFTER IRVINE AND BARAGAR (1971) AND JENSEN (1976) OF SAMPLES COLLECTED, CONGLOMERATE LAKE AREA.

No.	Field No.	Field Name	Laboratory Name*	Jensen
1	6A-2-1	Amygdaloidal Flow	Hawaiite Sodic Alkalic Basalt	Calc-Alkaline Basalt
2	6A-2-1D	Amygdaloidal Flow	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Basalt
3	6A-5	Feldspar Porphyry-Flow?	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt
4	6A-7-2	Mafic Flow	Calc-Alkaline Dacite (High Alumina)	Tholeiitic Dacite
5	6A-8	Feldspar Porphyry Flow	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Andesite
6	6A-13	Mafic Volcanic	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Andesite
7	6A-16	Mafic Flow	Tholeiitic Basalt	Tholeiitic Basalt
8	6A-24-1	Mafic Flow	Tholeiitic Basalt (High Alumina)	Tholeiitic Basalt
9	6A-24-2	Qtz. Porphyry Felsite	Calc-Alkaline Rhyolite	Calc-Alkaline Dacite
10	6A-24-2D	Qtz. Porphyry Felsite	Calc-Alkaline Rhyolite	Calc-Alkaline Dacite
11	6A-29-2	Clastic Mafic Volcanic	Tholeiitic Andesite (High Alumina)	Tholeiitic Basalt
12	6A-30-1	Interm. Lapilli-Tuff	Tholeiitic Basalt (High Alumina)	Calc-Alkaline Basalt
13	6A-46-1	Banded Mafic Flow	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Andesite
14	6A-99-1	Banded Mafic Tuff	Tholeiitic Basalt	Basaltic Komatiite
15	6A-103-1	Banded Mafic Tuff	Tholeiitic Basalt (High Alumina)	Tholeiitic Basalt
16	6A-103-2	Lapilli-Tuff/Tuff-Breccia	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Andesite
17	6A-128-1	Int. Felsic Qtz. Feldspar Porphyry	?	Calc-Alkaline Andesite
18	6A-129-3	Int. Felsic Lapilli-Tuff	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Dacite
19	6A-135-1	Qtz. feldspar porphyry	?	Calc-Alkaline Andesite
20	6A-553	Mafic Flow	Tholeiitic Basalt (High Alumina)	Calc-Alkaline Basalt
21	6A-556	Mafic Flow	Tholeiitic Basalt (High Alumina)	Tholeiitic Basalt
22	6A-560-3	Chlorite/Sericite Schist (Felsic Tuff)	Alkali Basalt, Sodic Series	Tholeiitic Basalt
23	6A-578-1	Interm. Lapilli-Tuff	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Basalt
24	6A-579-1	Lapilli-Tuff	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt
25	6A-593	Porphyritic Mafic Flow	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Basalt
26	6A-616-1	Mafic Lapilli-Tuff	Tholeiitic Basalt	Tholeiitic Basalt
27	6A-616-2	Mafic Lapilli-Tuff	Calc-Alkaline Andesite	Calc-Alkaline Basalt
28	6A-624-1	Mafic Flow	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Andesite
29	6A-624-1D	Mafic Pillowed Flow	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Andesite

Table 3 continued

No.	Field No.	Field Name	Laboratory Name*	Jensen
30	6A-632-1	Mafic Int. Lapilli-Tuff	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt
31	6A-632-1D	Mafic Int. Lapilli-Tuff	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt
32	6A-637-1	Mafic Lapilli-Tuff	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Andesite
33	6A-638-1	Porphyritic Flow	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Andesite
34	6A-654-2	Mafic Crystal Tuff	Tholeiitic Basalt (High Alumina)	Tholeiitic Basalt
35	6A-656-1	Felsic Tuff	Calc-Alkaline Rhyolite	Calc-Alkaline Rhyolite
36	6A-681-1	Massive Mafic Volcanic	Calc-Alkaline Basalt	Calc-Alkaline Basalt
37	6A-687-1	Massive Mafic Volcanic	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Andesite
38	6A-695-1	Pillowed Mafic Flow	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Basalt
39	6A-722-1	Banded Mafic Tuff	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt
40	6A-722-1D	Banded Mafic Tuff	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt
41	6A-748	Mafic Volcanic	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Basalt
42	6A-1109-1	Tuff-Breccia	Calc-Alkaline Andesite (High Alumina)	Calc-Alkaline Basalt
43	6A-1109-2	Tuff/Flow?	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Andesite
44	6A-1110-1	Tuff-Breccia	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt
45	6A-1119-1	Mafic Flow	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt
46	6A-1120-1	Banded Tuff	Tholeiitic Basalt	Tholeiitic Basalt
47	6A-1151-2	Mafic Flow	Tholeiitic Basalt	Tholeiitic Basalt
48	6A-1197-1	Mafic Flow-Breccia	Calc-Alkaline Basalt (High Alumina)	Calc-Alkaline Basalt

*Based on Irvine and Baragar (1971)
D indicates duplicate analyses
Analyses of specimen 1 and 2 may be contaminated by amygdules

Abbreviations:
Int. — Intermediate
Interm. — Intermediate
Qtz. — Quartz

Conglomerate Lake Area

Tuff

Adjacent to the southern margin of the map-area, tuffs are poorly exposed. Elsewhere in the map-area, the most markedly felsic tuffs having silica contents up to 80 percent (Table 2) are located: 1) in an area along a logging road off the road joining Castlewood Lake and the Mine Roads, about 2.4 km south of the south shore of Conglomerate Lake; 2) along the turn of the Castlewood Lake Road 800 m north of the branch off of the road described above, or 1000 m south of the culvert bridge on Castlewood Lake Road across Castlewood Creek. These rocks form units of thinly laminated aphanitic to fine-grained tuff approximately 20 m wide. Each unit consists of individual laminae 10 to 80 mm thick, weathers grey to white, and can be traced along strike for only limited lengths. The origin of these rocks is not known; they can be interpreted to have a felsic flow origin, or be ascribed to precipitation during fumarolic activity, or be considered to have a pyroclastic origin.

In thin section, most of these rocks are revealed to be recrystallized. In specimens where recrystallization is less intense, the rocks consist of aphanitic to fine-grained aggregates of quartz and albite (85 percent), sericite, and epidote with accessory biotite, sphene, carbonate, and opaque minerals. The feldspars, biotite needles, and elongated quartz grains display a well-developed foliation. The bedding is defined by: a) a minor grain-size variation within the quartz and feldspar, and b) changes in the proportions of sericite, chlorite, and opaque minerals.

Crystal Tuff, Lapilli-Tuff, Lapillistone, Tuff-Breccia, and Pyroclastic Breccia

These rocks are restricted almost exclusively to the southern margin of the map-area and form the northernmost extension of a more extensive sequence underlying the northwestern and southwestern corners of Elmhirst Township (Mackasey and Wallace 1978, p.15). A narrow unit is crossed by the Auden Road in the centre of the west boundary of the map-area. In the field, the rocks weather grey to light grey and are composed of a grey-green to light grey matrix in which light and dark weathering, porphyritic, subrounded to subangular fragments occur. Many combinations of matrix fragment composition, matrix-fragment size, and variations in the proportions of the rock and matrix-fragment textures are observed in the outcrops. The classification of pyroclastic rocks used in this report uses the parameters proposed by R.V. Fisher (1966).

Isolated occurrences of crystal tuff (2g) were mapped. This rock is not included in Fisher's classification system, but is hereby used to describe those rocks which in outcrop look like feldspar porphyry flows and feldspar and/or quartz porphyry dikes. Crystal tuff differs from the flows and dikes just mentioned in that it contains broken crystals, crystal fragments, randomly distributed fragments of lapilli to bomb-size fragments, and evidence of crude bedding. Microscopically, these rocks are composed of lensoid lapilli- and bomb-size rock fragments with feldspar and quartz crystal fragments, set in a fine-grained tuffaceous quartzofeldspathic groundmass (0.02 to 0.05 mm) containing patches of quartz, sericite, epidote, zoisite, biotite, carbonate, and opaque minerals. The

fragments are made up of mafic to felsic metavolcanics, subhedral crystals of oligoclase (3 mm), and less frequently polycrystalline quartz grains (1 to 2 mm). In the specimens examined, these rocks neither contain chloritoid nor shard-like features as reported in similar rocks to the north (Thurston 1976) and south (Mackasey and Wallace 1978) respectively.

Lapilli-tuff (2b) and tuff-breccia (2c) are the most abundant and widespread coarse pyroclastic rocks, and they commonly grade into each other, or crystal tuff, lapillistone, and pyroclastic breccia. The lapilli-tuff and tuff-breccia consist of mafic to felsic volcanic fragments which have the size of lapilli and bombs, in a tuffaceous and bedded matrix. The fragments resemble the matrix in their weathered colours and compositions, and are usually only apparent on clean, well-weathered outcrops. The fragmental feature is also quite evident on freshly peeled outcrop surfaces. Most of the fragments have been deformed by regional metamorphism, and are elongate and ellipsoidal in shape; the long axes parallel the regional foliation.

Lapilli-tuff and tuff-breccia grade into pyroclastic breccia (2c) as the size and proportion of the fragments increase. Pyroclastic breccia is rare, but where observed is made up of blocks as long as 1 m along the long axis and minor lapilli-size fragments of mafic to felsic metavolcanics which together are set in a fine-grained non-bedded tuffaceous matrix.

Chemical analyses representing the bulk rock chemistry of intermediate to felsic pyroclastic rocks are given in Table 2.

Quartz Porphyry (2m), Quartz-Feldspar Porphyry (2dm), Feldspar Porphyry (2d)

These units probably represent intermediate to felsic metavolcanics and occur as: a) dike-like features in the mafic metavolcanics, especially in the northeast part of the map-area and; b) narrow sill-like features in the area south of Castlewood Lake. These rocks resemble porphyritic flows and crystal tuffs in outcrop in that they are composed of a greenish, fine-grained matrix in which variable sizes of oligoclase metacrysts (and rarely grains of quartz) are randomly distributed (Photo 5). These rocks differ from flows and pyroclastic rocks in that they are devoid of rock fragments, amygdules, bedding, selvages, or other distinguishing flow or pyroclastic features. In thin section, the oligoclase(?) phenocrysts are revealed to be subhedral to euhedral, compose 20 to 60 percent of the rock, and range in size from 1 to 10 mm, but average 3 mm in diameter. The plagioclase is usually altered to sericite, saussurite (clinozoisite), and epidote, and the micaceous matrix, composed of chlorite (10 to 35 percent), carbonate, sphene, epidote, and albite, tends to drape around the well-formed plagioclase crystals.

Chemical analyses of four porphyritic intermediate to felsic metavolcanics of unknown origin are given in Table 2.

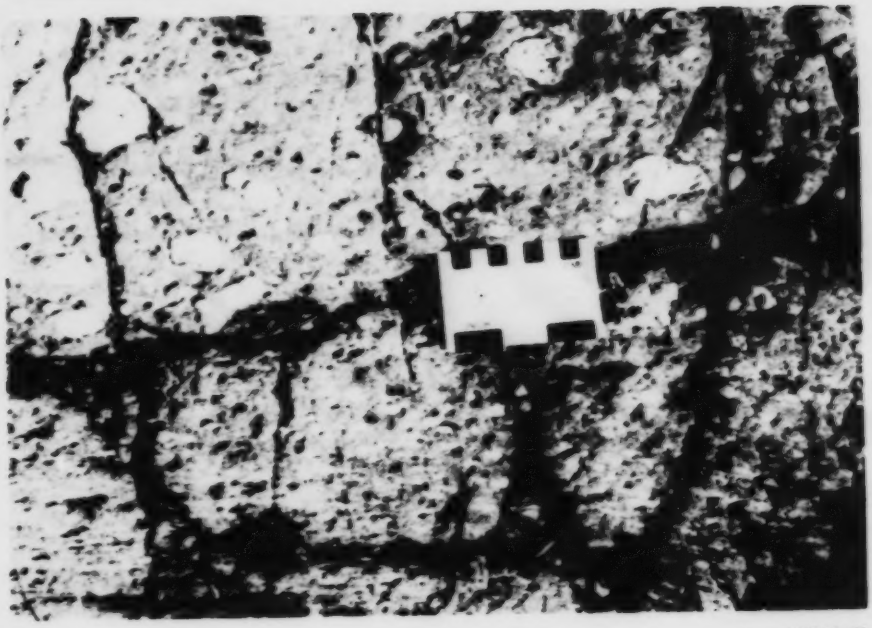

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Photo 5–Typical feldspar porphyry unit of unknown origin in outcrops on the south shore of Castlewood Lake. Note: the phenocrysts are elongated by tectonism in the bottom of the photograph.

Metamorphism and Petrochemistry of Metavolcanics

Metamorphism

The metamorphic mineral assemblages identified in the metavolcanics include: 1) chlorite + amphibole (actinolite) + epidote + albite ± sphene ± quartz ± carbonate ± muscovite; 2) hornblende + epidote ± albite ± almandine ± biotite ± quartz ± carbonate. These mineral assemblages indicate a metamorphic rank equivalent to the middle and upper greenschist facies of T.F.W. Barth (1952).

In the field, most of the mafic metavolcanics are light coloured and react with dilute hydrochloric acid. It would appear that carbonatization is the principal type of alteration. Microscopic studies, however, suggest that carbonate is not abundant. It is possible that the light colour may also be attributable to the weathering of clay minerals.

In local areas of intense cataclasis and/or dynamothermal metamorphism, a direct increase in the amount of the metamorphic minerals amphibole, chlorite,

sericite, quartz, and the grain size has produced respectively schistose amphibolite, chlorite, or sericite schists, silicified metavolcanics, and massive, coarse-grained recrystallized metavolcanics.

Petrochemistry

A suite of forty-five metavolcanics was chemically analyzed by the Geoscience Laboratories, Ontario Geological Survey. Twenty grab samples and twenty-two specimens were analysed using complete and partial chemical analytical methods, Table 2. These samples were considered to be relatively unaltered and representative of the typical units within the map-area. The location of all chemically analyzed samples is given on Map 2429, back pocket. The results were used as an overall guide for the study and classification of the metavolcanics.

During the field survey, the metavolcanics were arbitrarily subdivided into mafic, intermediate, and felsic rocks on the basis of their colour index. This classification was for the most part adequate, but because they were coded as mafic to intermediate (unit 1 on Map 2429, back pocket) and intermediate to felsic (unit 2 on Map 2429, back pocket), a problem arose as to where to place intermediate rocks of andesitic composition, namely should they be between 55 to 59 percent SiO_2. This included most of the feldspar porphyries. The chemical differences split the andesite range at the 58 percent SiO_2 and 5 percent total iron as FeO for the mafic to intermediate-intermediate to felsic boundary. True felsic rocks of rhyolite composition are rare, being only representated by two felsic tuff units previously described.

According to the AFM diagram and other criteria in the system of classification proposed by T.N. Irvine and W.R.A. Baragar (1971), and the Jensen Cation Plot (Jensen 1976), the metavolcanics of the Conglomerate Lake area are derived from the differentiation of a calc-alkaline parent magma (Figures 2, 3 and 4). This condition is analogous to that reported by Mackasey and Wallace (1978) in the area immediately to the south, but differs from the predominantly tholeiitic rocks of the North Onaman area immediately to the north (Thurston 1976, p.23). Rocks predominant in the map-area have retained their original basaltic composition. Andesitic rocks form a smaller proportion of the mafic to intermediate metavolcanics, and do not appear to occur in specific areas. They are considered to grade into, and to be interbanded with the basalts without regard to a specific stratigraphic order because of the following: the monotonous aerial extent of the mafic flows; the lack of distinctive and continuous marker horizons; and the available data on diamond drilling is random and does not intersect significant lithologic contacts. It is difficult to construct a good stratigraphic column for the metavolcanics.

METASEDIMENTS

Poor, but adequate exposure of metasediments permits the definition of a narrow, but distinct belt within the metavolcanics astride the Onaman River

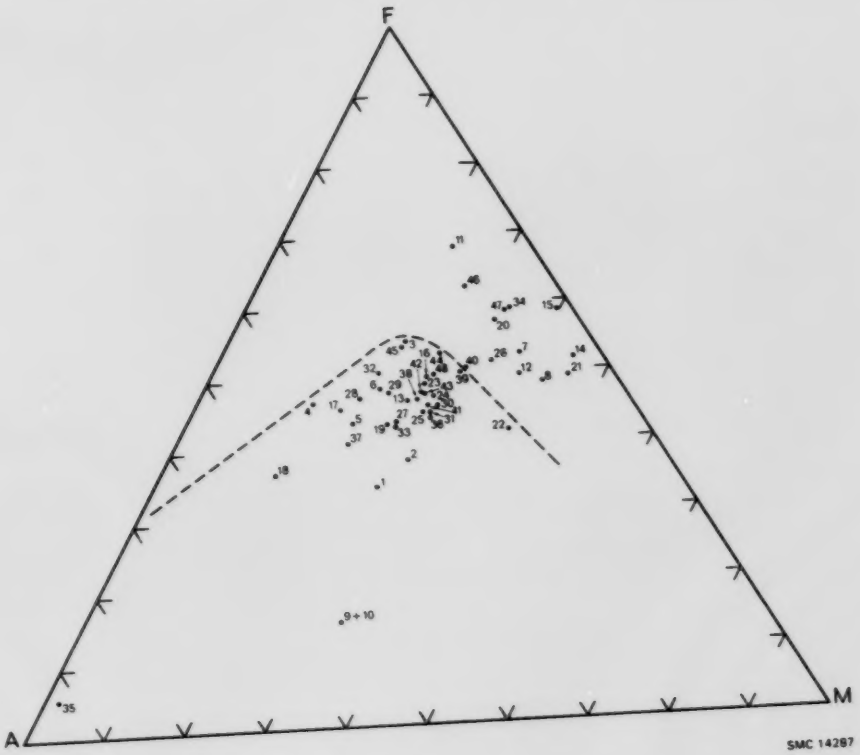

Figure 2–AFM plot of Conglomerate Lake area metavolanics (after Irvine and Baragar 1971).

and Con Creek. The unit is almost exclusively clastic and is made up of rudaceous (conglomeratic), argillaceous, and arenaceous, detrital rocks. A few outcrops of iron formation and several metaconglomerate outcrops containing iron formation clasts were also mapped by the field party.

Clastic Metasediments

Metaconglomerate is the most abundant of the clastic metasediments and is found throughout the strike length of the metasedimentary unit. Sandstone subunits composed of arkose, arkosic wacke, and lithic sandstone with or without mudstone (slates, siltstones) make up thin subunits interbedded with the metaconglomerate and with the metavolcanics.

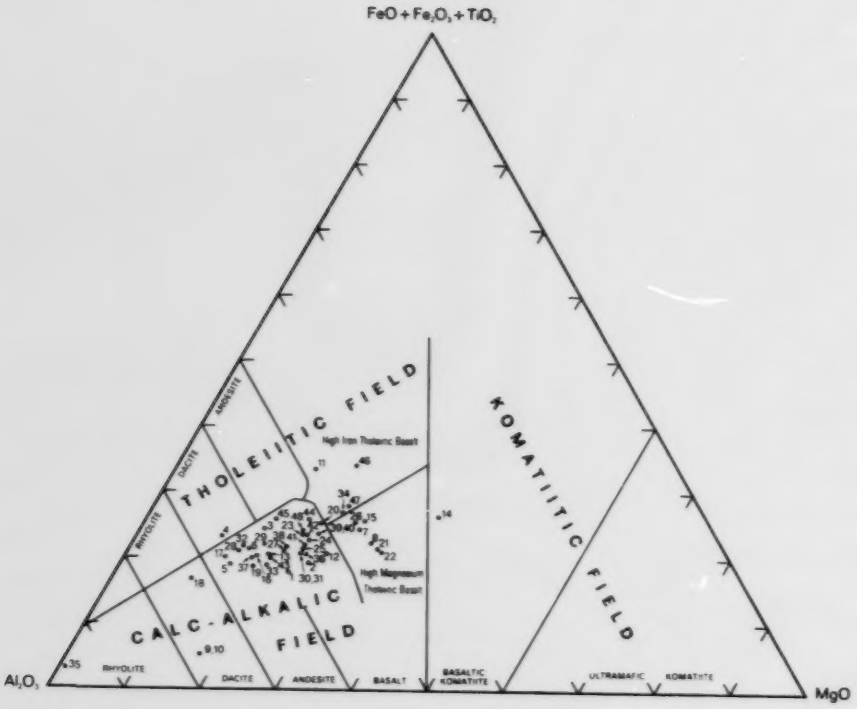

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Figure 3–Jensen Cation Plot of Conglomerate Lake area metavolcanics.

A total of 15 specimens of the metasediments were studied microscopically. Partial chemical analyses are available for twelve of these (including one analysis of a clast sample), in Tables 4, 5, and 6.

Conglomerate

The most typical conglomerate exposures are infrequently bedded (see Moorhouse 1938, Photo 10, p.9), but often are clast-supported, polymictic pebble to cobble conglomerate with 5 to 30 percent matrix (Photo 6). Outcrops of a matrix-supported, polymictic pebble conglomerate occur on the shores and south of Conglomerate Lake. The matrix of the conglomerate is extremely variable in lithology. In the area around and south of the south shore of Conglomerate Lake and west of Con Lake, the matrix is sheared, chloritic, and/or of mudstone grain size. In the Con Creek area along and south of the Mine Road and northwest of

TABLE 4 MODAL ANALYSES OF THREE SPECIMENS FROM GRANITIC BOULDERS IN THE METACONGLOMERATES, CONGLOMERATE LAKE AREA.

Sample Number	6A029-3	6A032-1	6A577-2
Quartz	50	40	
Orthoclase	10		
Plagioclase	35 (An_4)	40	
Quartzofeldspathic material			60
Chlorite		10	15
Tremolite/Actinolite			10
Muscovite/Sericite	5	5	
Epidote			15
Carbonate		5	
Field Name	Granodiorite	Granitic or Felsic Volcanic(?)	Altered quartz diorite mafic to intermediate volcanic

TABLE 5 PARTIAL CHEMICAL ANALYSIS OF ONE SPECIMEN FROM A GRANITIC COBBLE OF THE METACONGLOMERATES, CONGLOMERATE LAKE AREA. CHEMICAL ANALYSIS BY GEOSCIENCE LABORATORIES, ONTARIO GEOLOGICAL SURVEY.

Sample Number: 3; Field Number: 6A029-3

Element	Weight Percent
SiO_2	77.2
Al_2O_3	13.5
FeO as Fe_2O_3	1.23
MgO	0.31
CaO	0.32
Na_2O	3.61
K_2O	1.22
H_2O^+ (Ignition Loss)	1.39
TiO_2	0.16
P_2O_2	0.05
MnO	0.02
Total	99.6

TABLE 6 | PARTIAL CHEMICAL ANALYSES[1] OF 12 SELECTED GRAB SAMPLES FROM THE METASEDIMENTARY UNIT, CONGLOMERATE LAKE AREA. NOTE THAT THE LOCATION OF ALL ANALYSED SAMPLES IS GIVEN ON MAP 2429, BACK POCKET.

Major Components in Weight Percent

Sample Number	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	H_2O^+	TiO_2	P_2O_5	MnO	Total	Field Name
6A-1170-1	66.6	17.0	6.04	1.32	0.65	2.55	1.90	3.03	0.72	0.10	0.09	100.0	Lithic Wacke
6A-1169-1	71.8	15.0	2.96	1.42	0.57	4.86	1.59	1.79	0.25	0.10	0.03	100.4	Slate
6A-33	68.9	15.1	3.51	0.97	0.78	3.34	3.23	1.55	0.43	0.09	0.04	97.9	Subarkose
6A-35-1	73.7	15.1	1.93	0.41	1.89	4.30	2.44	0.63	0.19	0.08	0.04	100.1	Subarkose
6A-35-1D	72.4	15.0	1.93	0.41	1.89	4.19	2.44	0.71	0.18	0.08	0.04	99.3	Subarkose
6A-37	77.1	12.7	1.22	0.50	0.97	3.59	2.50	0.95	0.17	0.07	0.03	99.7	Subarkose
6A-029-1	77.3	9.94	5.63	1.59	0.45	0.41	1.47	2.35	0.17	0.06	0.10	99.5	Conglomerate
6A-037-1	75.4	13.2	2.28	1.04	0.63	4.81	1.02	1.27	0.23	0.08	0.03	100.0	Conglomerate
6A-29-3	77.2	13.5	1.23	0.31	0.32	3.61	1.22	1.39	0.16	0.05	0.02	99.0	Granitic Clast
6A-577-1	56.5	14.6	12.3	5.73	2.47	2.73	0.36	4.23	1.02	0.10	0.18	100.2	Conglomerate
6A-1169-3	53.7	20.1	12.4	1.95	0.76	1.95	1.85	6.63	0.84	0.10	0.10	100.4	Shale
6A-1169-2	65.8	16.5	4.01	1.89	1.78	2.85	3.19	2.87	0.40	0.11	0.08	99.5	Shale
6A-36	72.1	13.7	3.53	1.13	1.42	3.41	2.13	1.63	0.21	0.09	0.07	99.4	Subarkose

[1]All analyses performed by Geoscience Laboratories, Ontario Geological Survey.

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Photo 6–Typical polymictic metaconglomerate from outcrops just south of the mine road, at Con Creek (Photo by John Scott).

Con Lake, the matrix is, however, of sand size and texture, consisting of oblong grains of feldspar and quartz cemented together by chlorite, epidote, calcite, and muscovite. The clasts observed range in the Wentworth size range from pebbles (4 to 64 mm) to boulders (over 256 mm), and their composition is also variable. In the Con Creek area astride the Mine Road, cobbles and boulders of mafic metavolcanics and metagabbro predominate over granodiorite, porphyritic "granite", and felsic metavolcanic clasts (Photo 6). In the area northwest of Con Lake, granitic boulders and cobbles by far outnumber metavolcanic, quartz, and chert clasts (Photo 7). These granitic boulders and cobbles are fairly well rounded and are almost always elongated by deformation into ellipsoidal forms with long axes parallel to the regional foliation (Photo 7). A "tail-like" feature is a typical characteristic of most of these granitic clasts over most of the map-area. On the outcrops located along, and just west of the Con Lake Road, about 4 km northwest of Con Lake, granule- and pebble-sized clasts of ferruginous chert and iron formation are interspersed in the matrix. The iron formation pebbles are made up of layered microcrystalline quartz and magnetite.

In thin section, the conglomerate matrix varies from very fine grained in mudstone-chloritic types to medium grained in sandstone types, and in the latter is made up of grains (less 2 mm) of feldspar and quartz (40 percent of matrix),

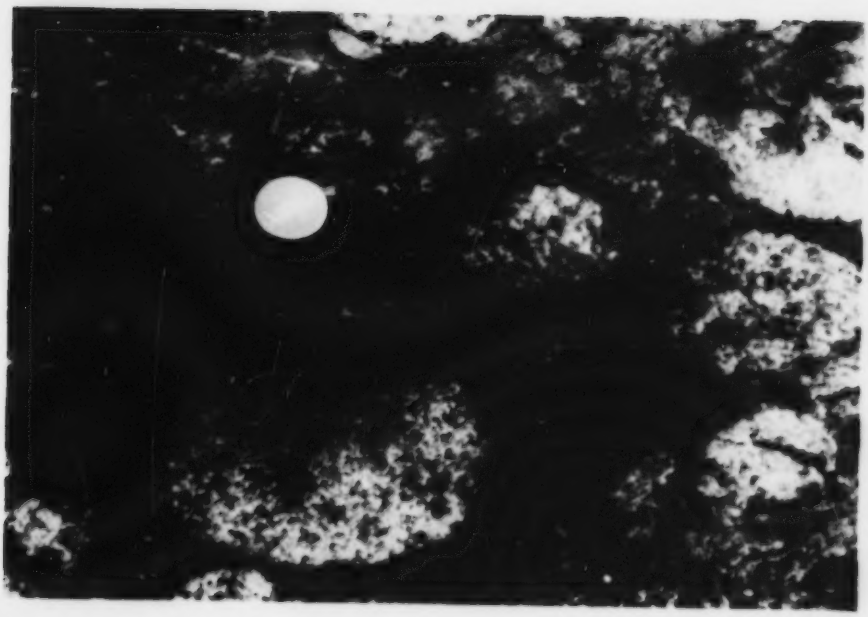

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Photo 7–Predominant granitic clasts in parts of the metaconglomerate unit west of Con Lake Road, east of Con Creek.

muscovite, carbonate, epidote, and opaque minerals cemented by chlorite (35 percent of groundmass) and sericite. Thin sections taken from four different granitic boulders in the metaconglomerate revealed that most of these rocks are relatively fresh and are similar to the other intrusive granitic rocks observed in the map-area (Photo 8; see also Moorhouse 1938, p.8). Modal analyses of these specimens and a partial chemical analysis of one of the clasts are listed in Tables 4 and 5. In areas where the matrix is chloritic and/or mud-size, granules and pebbles of mafic metavolcanic clasts are almost indistinguishable. This was also found by Thurston (1976, p.31).

Partial chemical analyses representing the bulk rock chemistry of three metaconglomerates (see Table 6) indicate the influence of the variable composition of the clasts on the rocks.

Sandstone

The sandstone units are best exposed west of Con Creek, about 3.2 km northwest of Con Lake where they are composed of subarkose, arkosic wacke, and lithic sandstone (rare). The rock types are usually medium to coarse grained,

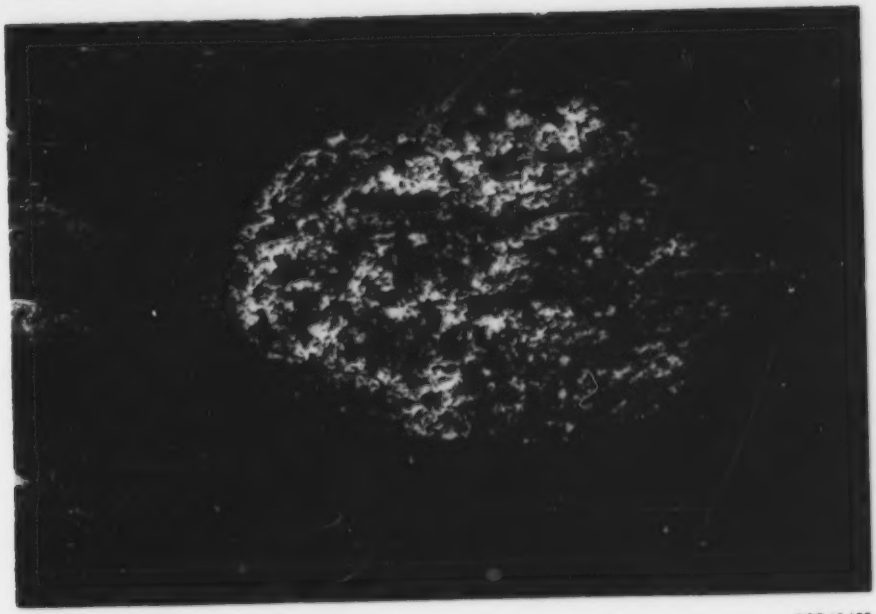

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Photo 8—Relatively fresh granitoid cobble retaining porphyritic granitic texture in outcrops south of the Mine road, at Con Creek (Photo by John Scott).

massive, and remarkably uniform in composition.

On the weathered surfaces, the sandstone is light grey, and has the appearance of being predominantly feldspathic. The feldspar encloses quartz eyes and gives the rock the appearance of an intrusive porphyry.

The sandstone has retained sedimentary features such as bedding, crossbedding, and graded bedding. Interpretations of tops provided conflicting results, probably because the beds have been isoclinally folded and tilted into near-vertical strata.

In thin section, sandstone is seen to be poorly sorted, containing sand-size (0.06 to 2 mm) grains of plagioclase (45 to 70 percent), subangular to subrounded quartz (20 to 30 percent), orthoclase (10 to 20 percent), and biotite which form a framework cemented by calcite, chlorite, sericite, opaque minerals and muscovite. Only a minor amount of matrix is present. The feldspars are partly altered to sericite and clinozoisite (saussurite). Lithic clasts were seen in only one sample of the six thin sections studied. Two or more outcrops on the south shore of Conglomerate Lake, from which the sample was collected, contained visible mafic metavolcanic clasts. This lithic sandstone is not extensive, but strings of boulders were observed in the sandstone by W.W. Moorhouse (1938, p.9) who reported that:

> It is interesting to note that in an outcrop southeast of Conglomerate Lake well rounded boulders

of granite are almost indistinguishable from the feldspathic matrix that envelopes them [the sandstones].

Partial chemical analyses of six metasandstones were done to serve as a comparison to others in the literature and are presented in Table 6.

Mudstone

Sheared, green (chloritic) or black and often heavily carbonatized thin lenses of mudstone (slate, shale, siltstone, phyllite) are interbedded with metaconglomerate and mafic metavolcanics on the south shore of and south of Conglomerate Lake. Mudstone units are too thin to be delineated on the map (Map 2429, back pocket), and are also interbedded with the volcanic tuffs in the area southwest of Con Lake. Rocks interpreted to be calcareous mudstone by the author occur in the sandstone units northwest of Con Lake. These rocks were described by Moorhouse (1938, p.9) who accurately noted a peculiar but characteristic feature of the sandstone, in which a:

> Universal occurrence of small lenses of soft (carbonate-rich), greenish (grey) material (chlorite and carbonate), which weather out readily on the surfaces of the outcrop and are often cut by fracture cleavage on a tiny scale.

Mudstone is not always easily distinguishable from fine-grained tuff and where mudstone is sheared and reduced to green or black carbonatized chloritic rocks composed of minute angular grains of quartz, chlorite, biotite, muscovite, and carbonate, the rock's distinction in the field was based on the field relationship with the surrounding rocks.

As seen in thin section, typical less altered mudstone is composed of clay- and silt-sized fragments less than 0.004 mm and 0.004 to 0.06 mm respectively, grains of quartz and feldspar (50 percent), cemented by clay-size chlorite, mica, carbonate, epidote, plagioclase, and opaque minerals. A fine lamination that ranges from 0.05 to 1.0 mm, is caused by the distribution of quartz and feldspar, mica, and the variation in grain size.

Several units of reworked tuffs (3 j) are interbedded and often indistinguishable from metamudstone.

Several narrow exposures of graphite schist are interbedded with the metasediments and metavolcanics. Some 0.3 to 1.5 m wide sections were also intersected in the diamond-drill programmes of several companies.

Partial chemical analyses of three specimens of selected mudstones are listed in Table 6 with the rest of the clastic metasediments.

Iron Formation

Only a few outcrops of iron formation as defined by G.A. Gross (1965, p.83) were found in the map-area. These outcrops outline a poorly defined band of iron formation 3 to 6 m thick within the sandstone unit west of Con Creek, about 5 km northwest of Con Lake. The iron occurs in the form of small magne-

tite octahedra interspersed in microcrystalline quartz (or chert).

Origin and Metamorphism of Metasediments

The metasediments are derived from eroded metavolcanic and igneous detritus. The clastic metasediments are considered to have been locally derived because of the following observations:

a) They are poorly sorted;
b) All sand grains are relatively fresh and angular to subrounded;
c) Most of the sandstones contain little to no matrix;
d) The granitoid boulders are relatively fresh and are similar to the surrounding granitic intrusive rocks in the area (see "Intermediate to Felsic Intrusive Rocks");
e) The quartz and feldspar clasts are coarse grained, strikingly resemble the porphyritic igneous rocks of the map-area, and are remarkably uniform in composition (Moorhouse 1938, p.11);
f) Some of the metasedimentary subunits are not laterally continuous;
g) All of the iron formation pebbles and some of the metavolcanic cobbles and pebbles are angular to subangular, some of the clast edges almost retaining the sharp original angles. These conditions could not have occurred under prolonged transportation and exposure to weathering processes.

Because the metasedimentary unit has been tilted into near-vertical beds, and because of inadequate exposure in cross-section, it is difficult to infer the direction from which the detrital material was derived. However, some observations may imply a source existed east of the map-area. Moorhouse (1938, p.11) has suggested the following observations are critical:

1) The conglomerate unit occurs to the east of the sandstone unit everywhere along Con Creek;
2) The "tail-like" features displayed by granitoid clasts in the area may indicate the eddying turbulent nature of the depositing currents from the east because these "tails" are predominantly found on the leeward side of the boulders, but away from the boulders, they interfinger with the fine-grained chloritic matrix of the rocks. These strings are believed to be lenses of feldspathic sand deposited by active currents in the lee of the boulders. Owing to their original composition and metamorphism, they appear granitic, and even in places are continuous with the granite boulders which they accompany (Moorhouse 1938, p.11). This state precludes the alternate explanation of these "tails" being products of tectonic events;
3) The occurrences of angular iron formation pebbles, which Moorhouse (1938) considered were derived from the Grasser Lake locality southeast of the map-area.

The metamorphic mineralogy of quartz + biotite + muscovite + chlorite + carbonate and quartz + albite + biotite + muscovite + chlorite + carbonate ± epidote ± microcline ± actinolite indicates that the metasediments are metamorphosed under low greenschist facies metamorphic rank conditions (Turner 1968) similar to the rocks immediately to the north (Thurston 1976, p.22) and south (Mackasey and Wallace 1978, p.65-66).

Intrusive Rocks

A variety of intrusive rocks occur in the Conglomerate Lake area, and for reasons presented later in this section, these rocks are considered to represent different parts of a larger partly exposed composite body.

Four roughly circular, mafic to intermediate intrusions of gabbro and diorite, with local quartz-rich varieties constitute about 30 percent of the map-area. The granitic rocks constitute only 5 percent of the map-area, and represent four separate intrusions, only one of which is located entirely in the area. Several pink dikelets of granite material, pegmatite, and aplite, possibly the latest but related potash-rich phase, also intrude all rocks of the mafic to intermediate intrusions.

Mafic to Intermediate Intrusive Rocks

These rocks are principally gabbroic and dioritic rocks that may or may not contain quartz. It is not possible to subdivide them in the field because of the alteration of the mafic minerals. Plagioclase is also severely altered. Only small proportions of potassic feldspar are contained in the rocks, and the amount of quartz is nearly the same in all these rocks; thin section discrimination between these rocks is also difficult.

Thirty six specimens from the four gabbroic-dioritic intrusions were thin sectioned, and fourteen of these samples were also analysed chemically by the Geoscience Laboratories, Ontario Geological Survey (Tables 7 and 8), and comparative chemical and modal compositions of other plutonic rocks are given in Table 9. The individual intrusions are described separately below.

CROOKED GREEN LAKE INTRUSION

This intrusion was previously described by Moorhouse (1938, p.15):

> The diorite and/or gabbro area west of Crooked Green Lake varies in appearance. In places, as along the eastern contact near Crooked Green lake, it is fine grained and distinguished with difficulty from the lavas. Usually it is granular in texture, dark in colour, with or without blue eyes and splashes of quartz. It may be black and entirely hornblendic, as in one or two outcrops along the trail west from Crooked Green lake, or white and feldspathic with irregular hornblende grains scattered through it, as is the case in a high rocky hill 2½ miles [4 km] west of the lake. In places, the intrusive is apparently a granite. The relations between the dioritic and granitic phases are not known.
>
> In thin section, these rocks are composed of feldspar, hornblende, biotite, remnants of pyroxene, and considerable quartz, designated quartz diorite. The feldspars are so highly altered that it is usually impossible to determine their original character. Much, if not all the hornblende is a result of the alteration of pyroxene, which is rarely preserved.

The description by Moorhouse (1938) is accurate, but in the current study, quartz diorite is re-interpreted as quartz-bearing diorite and/or gabbro. The observed mineralogy of the rock is plagioclase (50 to 85 percent), hornblende (10 to 60 percent), with actinolite, quartz (0 to 10 percent), chlorite, epidote, sericite, orthoclase, microcline, carbonate, sphene, and opaque minerals. This composi-

TABLE 7 | COMPLETE AND PARTIAL* CHEMICAL ANALYSES[1] OF 14 SELECTED REPRESENTATIVE GRAB SAMPLES FROM THE FOUR MAFIC TO INTERMEDIATE INTRUSIONS OF THE CONGLOMERATE LAKE AREA. NOTE THAT THE LOCATION OF ALL THE SAMPLES IS GIVEN ON MAP 2429, BACK POCKET.

Major Components in Weight Percent

Sample Number	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O^+	H_2O^-	CO_2	TiO_2	P_2O_5	S	MnO	Total
6A-76	62.1	12.0	11.3	—	1.27	4.38	3.19	0.50	4.27	—	—	0.92	0.27	—	0.16	100.4
6A-76D	62.1	12.2	11.5	—	1.28	4.42	3.42	0.51	4.35	—	—	0.92	0.27	—	0.15	101.1
6A-1057-3	47.6	18.8	3.53	6.37	5.75	11.5	2.60	0.11	2.31	0.52	0.14	0.70	0.09	0.01	10.16	100.2
6A-1058-1	17.5	19.3	10.8	—	5.47	11.0	3.24	0.12	2.59	—	—	0.68	0.08	—	0.16	100.4
6A-731	49.0	10.5	8.36	—	11.8	16.2	1.78	0.84	1.07	—	—	0.53	0.15	—	0.14	100.4
6A-605-1	48.7	17.5	7.59	—	8.77	12.5	1.69	0.44	2.59	—	—	0.31	0.06	—	0.14	100.3
6A-1173-4	45.7	8.75	9.06	—	17.6	10.1	1.69	2.29	4.11	—	—	0.46	0.13	—	0.17	100.1
6A-612-1	49.6	14.4	8.27	—	11.1	12.0	0.57	0.04	4.15	—	—	0.30	0.06	—	0.16	100.7
6A-608-1	53.3	13.0	16.1	—	3.95	6.71	2.16	0.67	3.07	—	—	1.12	0.11	—	0.20	100.4
6A-71	49.0	19.8	7.19	—	7.17	11.2	1.65	1.35	2.71	—	—	0.36	0.06	—	0.13	100.6
6A-73-2	56.0	11.7	13.6	—	1.80	6.20	1.85	0.69	6.79	—	—	1.47	0.24	—	0.15	99.5
6A-66-2	50.4	15.5	11.0	—	6.53	11.6	1.34	0.15	2.91	—	—	0.57	0.08	—	0.19	100.4
6A-77-2	55.0	12.4	4.43	10.78	4.43	7.38	1.71	0.34	1.98	0.51	0.08	1.44	0.18	0.05	0.22	100.8
6A-73-1	49.6	15.8	3.28	8.40	3.16	10.7	1.65	0.15	2.71	0.49	3.26	1.00	0.09	0.05	0.24	100.6

*For partial analyses total iron determined as Fe_2O_3.

H_2O^-, CO_2, and S not determined.

[1]Note all analyses performed by Geoscience Laboratories, Ontario Geological Survey.

TABLE 8 | MODAL ANALYSES OF SELECTED REPRESENTATIVE GRAB SAMPLES FROM THE FOUR MAFIC TO INTERMEDIATE INTRUSIONS OF THE CONGLOMERATE LAKE AREA.

Sample Number	Quartz	Altered Plagioclase	Tremolite Actinolite	Chlorite	Carbonate	Biotite	Muscovite	Sphene	Epidote	Diopside	Tourmaline	Apatite	Opaques	Hornblende	Microcline	Orthoclase	Sericite and/or Zoisite	An %	Name
7A-66-2	10-15	35	25	20	Acc.	Acc.	Acc.	Acc.	—	—	—	—	—	—	—	—	—	—	Metagabbro
7A-71	2	32	30	5	—	—	—	1	30	—	—	—	—	—	—	—	—	74	Metadiorite
7A-73-1	—	50	30	—	6(7)	—	—	4	10	—	—	—	—	—	—	—	—	71	Hornblende Gabbro
7A-73-2	20	50	Acc.	25	Acc.	—	Acc.	—	—	—	Acc.	Acc.	2	—	—	—	—	—	Quartz Gabbro
7A-76	20	55	—	15	10	—	—	—	—	—	—	—	—	—	—	—	—	37	Quartz Gabbro
6A-72-2	10	35	—	5	—	—	—	—	10	—	—	—	—	40	—	—	—	62	Hornbl. Qz. Gabbro
6A-605-1	—	40	50	—	—	—	—	—	10	—	—	—	—	—	—	—	—	72	Diorite
6A-608-1	10	65	—	3	2	—	—	1	10	—	—	—	3	—	—	7	—	55	Quartz Gabbro
6A-612-1	—	50	30	—	1	—	—	—	20	—	—	—	—	—	—	—	—	88	Diorite or Gabbro
6A-731	—	17	80	—	—	1	—	1	2	—	—	—	—	—	—	—	—	53	Porph. Hbl. Gabbro
6A-1051-3	Acc.	60	—	Acc.	—	—	—	Acc.	20	—	—	—	—	20	—	—	—	63	Orbicular Gabbro
6A-1058-1	—	35	20	10	Acc.	—	5	Acc.	—	—	—	—	Acc.	—	—	—	10-15	57	Orbicular Gabbro
6A-1173-4	—	5	85	—	1	10	—	—	—	—	—	—	—	—	—	—	—	37	Hornblende Schist
6A-137-2	—	28	—	—	—	—	—	—	5	—	—	—	3	65	—	—	—	40	Quartz Diorite
6A-138	1	75	—	—	—	—	—	—	1	—	—	—	—	25	—	—	—	43(a)	Quartz Diorite
6A-139	—	60	25	—	—	—	—	—	10	—	—	—	—	—	—	—	4	40	Quartz Diorite
6A-141	—	65	—	—	—	—	—	—	1	—	—	—	—	35	—	—	—	35	Quartz Diorite
6A-679-1	10	65	—	—	—	5	—	—	1	3	—	—	—	2	10	—	5	—	Biot. Hbl. Diorite
6A-684-1	5	85	—	—	—	—	—	—	1	—	—	—	—	5	5	—	—		Hbl. Diorite
6A-699-1	5	80	—	—	—	2	—	1	3	—	—	—	—	10	—	—	—		Hbl. Syenodiorite
6A-707-2	7	75	—	—	—	—	—	1	2	—	—	—	—	1	—	15	—		Hbl. Syenodiorite
6A-709-1	5	70	—	—	—	—	—	1	—	—	—	—	—	20	—	5	—		Hbl. Diorite
6A-742-2	5	85	—	—	—	—	—	—	2	—	—	—	—	1	3	5	—		Syenodiorite Diorite
6A-742-2	3	50	—	—	—	—	—	—	17	—	—	—	1	20	—	—	10		Hbl. Diorite
6A-1001-1	—	40	—	Acc.	—	—	—	3	10	—	—	—	2	25	—	—	20	39	Diorite
6A-1002-2	—	15	53	15	10	—	—	—	20	—	—	—	—	—	—	—	5	38	Diorite
6A-1007	10	25	—	Acc.	—	—	—	—	Acc.	—	—	—	2	58	—	—	5	30	Quartz Gabbro

Table 8 continued

Sample Number	Quartz	Altered Plagioclase	Tremolite Actinolite	Chlorite	Carbonate	Biotite	Muscovite	Sphene	Epidote	Diopside	Tourmaline	Apatite	Opaques	Hornblende	Microcline	Orthoclase	Sericite and/or Zoisite	An %	Name
6A-1013	10	55	—	5	—	—	—	—	8	—	—	—	2	15	—	5	Acc.	34	Granodiorite
6A-1022	10	60	—	—	—	—	—	—	10	—	—	—	Acc.	15	—	5	—	34	Quartz Diorite
6A-1033	10	60	—	Acc.	—	—	—	—	5	—	—	—	—	20	—	5	—	32	Quartz Diorite
6A-1031	—	50	—	5	—	—	—	—	—	—	—	—	—	45	—	—	see plag.	37	Gabbro (?)
6A-1037	8	70	—	15	Acc.	—	—	—	2	—	—	—	—	5	—	—	—	33	Gabbro (?)
6A-1040	15	60	—	—	—	—	—	—	—	Acc.	—	—	—	15	—	5	5	36	Quartz Gabbro

Abbreviations:
Biot. — Biotite
Hbl. — Hornblende
Hornbl. — Hornblende
Porph. — Porphyritic
Qz. — Quartz
Acc. — Accessory amounts

Notes:
Location of samples are shown on Map 2429, back pocket.

TABLE 9 COMPARATIVE EXAMPLES REPRESENTING SOME CITED PLUTONIC ROCKS (LARSEN 1942) INDICATING APPROXIMATE CHEMICAL AND MODAL COMPOSITION OF SOME PRINCIPAL TYPES OF PLUTONIC IGNEOUS ROCKS.

	Modal Analyses				
	Gabbro	Diorite	Qz. Diorite	Granodiorite	Syenite
Quartz	—	2	20	21	—
Microcline					
Orthoclase	—	3	6	15	12
Microperthite					
Oligoclase	—	—	—	—	12
Andesine	—	64	56	46	—
Labradorite	65	—	—	—	—
Biotite	1	5	4	3	5
Amphibole	3	12	8	13	1
Orthopyroxene	6	3	1	—	—
Clinopyroxene	14	8	3	—	—
Olivine	1	—	—	—	—
Magnetite	2	2	2	1	2
Ilmenite	2	—	—	—	+
Apatite	—	trace	trace	trace	—
Sphene	—	trace	trace	1	trace
	Major Components in Weight Percent				
SiO_2	48.24	56.77	61.59	65.01	60.19
Al_2O_3	17.88	16.67	16.21	15.94	16.28
Fe_2O_3	3.16	3.16	2.54	1.74	2.74
FeO	5.95	4.40	3.77	2.65	3.28
MnO	0.13	0.13	0.10	0.07	0.14
MgO	7.51	4.17	2.80	1.91	2.49
CaO	10.99	6.74	5.38	4.42	4.30
Na_2O	2.55	3.39	3.37	3.70	3.98
K_2O	0.89	2.12	2.10	2.75	4.49
TiO_2	0.97	0.84	0.66	0.57	0.67
P_2O_5	0.28	0.25	0.26	0.20	0.28
H_2O	1.45	1.36	1.22	1.04	1.16
Density	2.976	2.839	2.806	2.716	2.757

tion indicates that the rocks of the Crooked Lake Intrusion have a composition that straddles the gabbro-diorite boundary according to the classification of L.D. Ayres (1972).

Several features are worthy of note in the Crooked Green Lake Intrusion, these are: 1) the presence of not only mafic xenoliths, but also a number of areas of mafic metavolcanics regularly distributed throughout the body; 2) the pres-

ence of granitic material within the body; and 3) the body is nowhere intruded by batholithic granitic rocks. Moorhouse (1938) has suggested that these features probably indicate that the intrusion may represent the upper contact phase of an underlying composite mass of batholithic "granite", as yet unexposed by erosion or uplift, and that the metavolcanic areas may possibly be remnants of roof pendants, the roof of the intrusive lying only slightly above the present surface.

Chemical and modal analyses of some rocks from the Crooked Green Lake Intrusion are listed in Tables 7 and 8. Analyses of average plutonic rocks are given in Table 9, for comparison.

CASTLEWOOD CREEK INTRUSION

Moorhouse (1938, p.13) has described this body as follows:

> The larger area north of Castlewood lake [that is astride the Castlewood Lake Road south of Castlewood Creek, the Creek almost bordering its eastern edge] is more variable. Some outcrops at its northeastern end are true granite; others along the north and east boundary of the intrusive are more properly designated as syenites and diorites. Inclusions of greenstone in the very middle of the mass suggest that the plane of erosion has intersected it just below its roof. With it are associated two rather peculiar types, which may be contact phases or related intrusives. One of these appears to be composed of grains of olivine, more or less altered, with much phlogopite enveloped in what appear to be huge altered hornblende crystals. The other is made up entirely of augite, with a little apatite.

Although in outcrop the intrusion is more variable than the Crooked Green Lake Intrusion, it is nevertheless predominantly made up of gabbro, diorite, and quartz-rich varieties. It is also subcircular, and hence similar to the above described intrusion. The author believes that Moorhouse's "true granite" outcrops at the northeastern edge represent later intrusive syenodioritic and granodioritic phases equivalent to the later granitic phases already described in the Crooked Green Lake Intrusion. The Castlewood Creek Intrusion differs from the Crooked Green Lake Intrusion in that: 1) the rocks of the Castlewood Creek Intrusion are more altered, plagioclase being almost completely sericitized and saussuritized; 2) hornblende and actinolite derived from the alteration of pyroxenes are more abundant in the Castlewood Creek Intrusion, sometimes making up to 80 percent of the rock; and 3) outcrops displaying a granodiorite and syenodiorite phase which weathers white are more numerous in the Castlewood Creek Intrusion.

Chemical and modal analyses of some of the samples from the Castlewood Creek Intrusion are listed in Tables 7 and 8. For comparison, analyses of average plutonic rocks cited in the literature are given in Table 9.

BOUNDARY INTRUSION

The Boundary Intrusion is a subcircular body located north of Pinel Creek between Hindson and Wedlock Lakes astride the boundary between Elmhirst

Township and the south-central border of the map-area. The aeromagnetic expression (ODM-GSC 1963; 1974a,b,c, and d) indicates that the intrusion extends into Elmhirst Township, and that it might be separated from the Elmhirst Lake Intrusion (granodiorite quartz diorite) of Mackasey and Wallace (1978) at Pinel Creek. The Boundary Intrusion is compositionally and texturally similar to the Crooked Green Lake Intrusion in hand specimen and thin section.

Outcrops are sparse in the area underlain by the Boundary Intrusion. Hand specimens from the intrusion are almost identical to those collected from the Crooked Green Lake Intrusion, therefore, no thin sections were made from samples taken from the Boundary Intrusion.

ONAMAN RIVER INTRUSION

This intrusion is also subcircular where it has been mapped and lies north of the Onaman River in the northwest part of the map-area. The rocks of the intrusion strikingly resemble the gabbroic pebble and cobble clasts in the metaconglomerate (see Photo 6).

In outcrop, the rocks of the Onaman River Intrusion are predominantly gabbros and are massive, medium to coarse grained, light grey on weathered surfaces, and dark grey to grey-green on fresh surfaces. A typical thin section reveals that the rock consists of coarse-grained, subhedral to anhedral laths and grains of labradorite (30 to 55 percent), hornblende-tremolite/actinolite (30 to 40 percent), chlorite (5 to 15 percent), epidote (10 to 15 percent), with or without quartz (up to 10 percent where blue quartz "eyes" occur) and minor amounts of calcite, sphene, and opaque minerals. In a few specimens, remnant pyroxene, surrounded by amphibole is preserved, and the feldspars are extensively saussuritized.

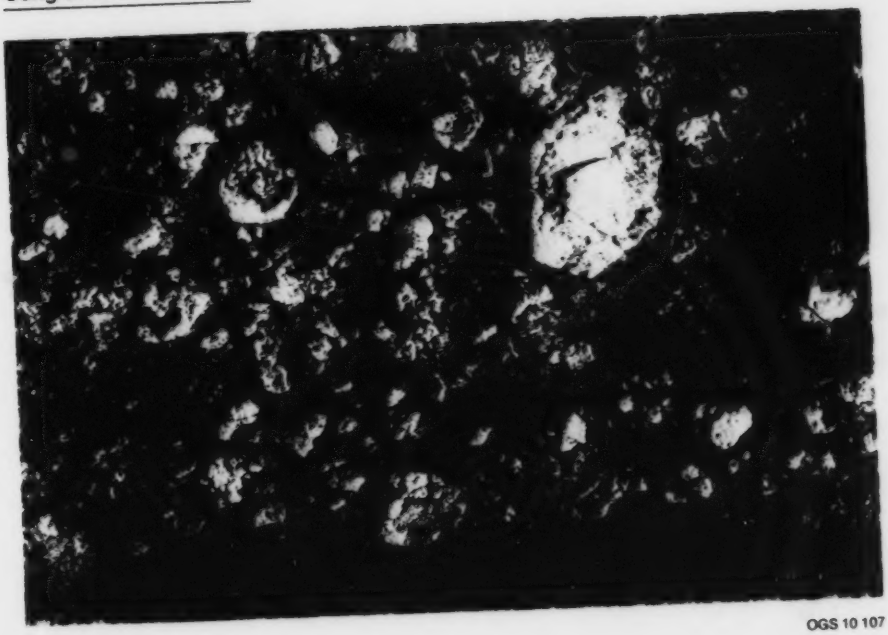
The intrusive relationship between the Onaman River Intrusion and the other subcircular mafic intrusions is unknown. The Onaman River Intrusion distinctly differs from the other intrusions because of the following reasons:

1) The light-weathering granodioritic phases were not noted in any of the gabbroic outcrops north of the Onaman River;
2) The Onaman River Intrusion is remarkably uniform in composition, the only variation being occasional splashes of blue quartz "eyes";
3) Islands of metavolcanics are absent;
4) In outcrop, the rocks resemble the mafic metavolcanic country rocks in composition, except for the blue quartz "eyes".

Analyses of samples of the Onaman River Intrusion are given in Tables 7 and 8.

OTHER MAFIC INTRUSIVE ROCKS

Smaller sills and dikes of gabbroic rocks occur in the map-area within the metavolcanics. Some of these gabbroic rocks could be coarse-grained flows, but others cross-cut the flows and are therefore of intrusive origin. In outcrops just



OGS 10 107

Photo 9–Megaporphyritic texture ("leopard-rock") in porphyritic gabbro, in outcrops on the road connecting Castlewood Lake and the Mine roads (Photo by John Scott).

north of the Castlewood Lake Road, 300 m north of the northeast shore of Castlewood Lake and west of Castlewood Creek, a narrow sill about 15 m wide consisting of a megaporphyritic gabbroic rock, "leopard rock", was observed. Similar outcrops from a sill of the same width are exposed on the road joining the Castlewood Lake and Mine Roads (Photo 9). In thin section, the megaporphyritic texture is composed of altered (epidotized) plagioclase porphyroblasts up to 4 cm across (Photo 9). These large phenocrysts are randomly orientated, and are set in a fine-grained groundmass of plagioclase-zoisite-muscovite-saussurite-sericite, tremolite-actinolite, chlorite, and minor sphene and quartz. Results of the chemical analysis of one sample and a partial chemical analysis of another sample of megaporphyritic gabbro are presented in Table 7. Table 8 contains modal analyses of these rocks.

Dark green biotite and hornblende lamprophyre dikes (units 4g, 4h; Map 2429, back pocket) up to 3 m wide cut several outcrops of the metavolcanics throughout the map-area. These dikes have a limited lateral extent and cannot be traced along strike for any considerable distances. Moorhouse (1938, p.14) noted a peculiar example along the shore of Conglomerate Lake cutting the metasediments and in one of the shear zones on the old Kenty Showing. Moorhouse (1938) reported that:

> It [the lamprophyre outcrop] has a granulated, salt-and-pepper appearance, and weathers very rapidly. The dikes are very irregular in shape, often curved, ...

These rocks were not studied extensively as they are very local in occurrence and are similar to rocks in the area to the north (Amukun 1977).

Dark narrow fine-grained mafic dikes of unknown origin outcrop throughout the map-area.

Rocks indicated as agmatite (unit 4q) and intrusive breccia (unit 4r) were formed by the intrusive effects of the mafic to intermediate intrusions on the surrounding country rocks. In both cases, a rock consisting of angular fragments of both the country rock and the intrusion is produced.

EMPLACEMENT AND METAMORPHISM OF MAFIC TO INTERMEDIATE INTRUSIVE ROCKS

The metamorphic mineralogy of chlorite + actinolite + epidote + albite ± sphene ± quartz and hornblende + epidote + albite ± biotite ± quartz ± sericite ± muscovite corresponds to the greenschist facies metamorphic rank.

The mafic to intermediate intrusive rocks of three of the intrusions are related to granitic emplacement, as the author has already speculated. These rocks may represent the earliest crystallized phase of the invading granitic magma, so that the three intrusions in question can conceivably be grouped with the granites. In this report they have been grouped with the more mafic intrusive types because of a known deposit of copper-nickel mineralization in a similar intrusion (Mackasey and Wallace 1978), and because of the predominant gabbroic-dioritic composition.

Intermediate to Felsic Intrusive Rocks

There are four bodies of granitic intrusive rocks within the map-area, but only one of these, the subcircular stock about 5 km southeast of Conglomerate Lake, is entirely located in the map-area.

In previous studies of granitic rocks in the adjoining areas (Thurston 1976, p.36; Amukun 1977; Mackasey and Wallace 1978, p.46) and some northern Ontario areas (Ayres 1974, p.61), the granitic intrusions consist of composite stocks or batholiths ranging in composition from trondhjemite to granodiorite, and to quartz monzonite. True granites are rare, but are commonly represented by apophyses of pegmatite, aplite, felsite, or quartz with or without feldspar porphyry. In the Conglomerate Lake map-area this is true, but the relative ages of the intrusions are unknown since the bodies are nowhere in contact with each other within the map-area, and no isotopic age determinations are available for them. In the map-area, the granitic batholiths are not intrusive into the gabbroic-dioritic intrusions, but are clearly intrusive into the metavolcanics as evidenced by: 1) chilling of the granitic margins against the metavolcanics in outcrops along the Con Lake Road, just north of Con Lake; and 2) the presence of metavolcanic xenoliths in the "granites".

In the field, all rock samples suspected to be granitic in origin were stained using a variation of the methods of F. Chayes's (1952), and C.B. Solar and J.J. Fahey (1972) whereby the rocks were first immersed in dilute hydrochloric acid

(to eliminate excess carbonate) before being treated with hydrofluoric acid (etch) and sodium cobaltinitrite (stain). The samples were than classified in the field using the guide of granitic rock nomenclature utilizing potash feldspar-total feldspar ratio and proportions of quartz (Ayres 1972). The classification of five specimens were verified by modal and chemical analyses, Tables 10 and 11.

WEST ONAMAN LAKE BATHOLITH

This body forms the western edge of a granitic intrusion that was previously described by Thurston (1976, p.36) who stated that:

> There are three bodies of granitic rocks within the map-area ... The intrusive body south of the [metavolcanic] belt lying principally west of Onaman Lake consists of biotite quartz monzonite to granodiorite.

According to Thurston (1976, p.38):

> [The body] lies between the [metavolcanic] belt and the migmatites of Onaman Lake, and extends from the south boundary of the [map-] area northeast for about 8 miles [13 km], attaining a maximum width of about 4 miles [6.5 km] close to the south boundary of the [map] area ... The batholith is poorly exposed, and several phases appear to be present. There appears to be a range from quartz monzonite through trondhjemite composition with biotite [as] the predominant mafic mineral ...

In the current map-area, the West Onaman Lake Batholith underlies the northeast corner of it where an adequate number of outcrops is exposed along the Con Lake Road and along the other subsidiary logging roads. The batholith consists of pink- to white-weathering outcrops of massive, medium- to coarse-grained granodiorite to quartz monzonite, with quartz "eyes" or phenocrysts in some areas giving the rock a local porphyritic texture. Biotite and hornblende were the only mafic minerals observed in the field and except for zones of aplite, pegmatite, and porphyry apophyses, their occurrence is ubiquitous. Hybrid-type rocks, agmatite and intrusive breccia, occur locally near the contacts with the metavolcanics.

In thin section, the rock specimens studied display a granitic (hypidiomorphic-granular) texture in which subhedral and anhedral interlocking laths and grains of sericitized and saussuritized plagioclase ranging in composition from andesine to oligoclase (65 to 70 percent), microcline (5 to 15 percent), and quartz (10 to 20 percent) occur. Euhedral and anhedral clots of biotite (1 to 5 percent), hornblende and its alteration products (chlorite and epidote), are the common ferromagnesian minerals and occur as interstitial intergrowths. Minor amounts of muscovite, sphene, apatite, carbonate, and opaque minerals are scattered throughout the rocks.

Partial and modal chemical analyses of two samples are presented in Tables 10 and 11.

TABLE 10 | PARTIAL CHEMICAL ANALYSES[1] OF SELECTED SPECIMENS OF GRANITIC ROCKS FROM CONGLOMERATE LAKE AREA.

Major Components in Weight Percent

Sample Number	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O^+	H_2O^-	CO_2	TiO_2	P_2O_5	S	MnO	Total	Feldspar Name
6A-14	71.1	14.1	2.71	—	0.74	1.81	4.82	2.14	2.23	—	—	0.36	0.12	—	0.06	100.2	Grano-diorite
6A-12	70.8	14.4	2.39	—	0.62	1.51	4.33	3.07	2.03	—	—	0.33	0.11	—	0.05	99.6	Grano-diorite
6A-94	71.3	16.1	1.03	—	0.34	0.90	6.17	3.20	0.67	—	—	0.14	0.07	—	0.02	99.9	Quartz Monzonite
6A-93	71.2	16.4	0.97	—	0.27	0.89	6.06	3.04	0.51	—	—	0.12	0.08	—	0.01	99.6	Quartz Monzonite
6A-93D	71.3	16.4	0.99	—	0.27	0.90	6.07	3.01	0.59	—	—	0.12	0.08	—	0.01	99.7	Quartz Monzonite
6A-92	70.6	16.0	0.95	—	0.25	1.03	6.44	2.61	0.47	—	—	0.14	0.08	—	0.01	98.6	Quartz Monzonite

[1]Note, all analyses performed by Geoscience Laboratories, Ontario Geological Survey.

Notes:
Location of samples are shown on Map 2429, back pocket.

TABLE 11 | MODAL ANALYSES OF SELECTED SPECIMENS OF GRANITIC ROCKS FROM CONGLOMERATE LAKE MAP-AREA.*

Sample Number	Plagioclase	Quartz	Orthoclase	Microcline	Sericite	Biotite	Muscovite	Hornblende	Carbon	Zircon	Epidote	Chlorite	Sphene	Fluorite (?)	Opaque	Plagioclase (An Content)	Rock Name
6A-012	60	27	10	—	—	2	1	—	4	4	—	—	—	—	—	15	Porphyritic Qz. Diorite
6A-014	65	25	—	—	8	2	—	—	—	—	—	—	—	—	—	16	Porphyritic Qz. Diorite
6A-029-3	45	40	10	—	—	—	5	—	—	—	—	1	—	—	—	4	Porphyritic Granitic clast
6A-032-1	40	40	—	—	5	—	—	—	5	—	—	10	—	—	—	—	Granitic Pebble
6A-035-1	61	20	10	5	—	2	1	—	—	—	1	—	—	—	—	12	Granitic dike
6A-092	70	20	—	8-10	—	29	Acc.	with Bio.	—	—	—	within Bio.	Acc.	Acc.	—	7	Bio.-Hbl. Qz. Monzo.
6A-093	65	12	—	15	—	4	Acc.	4	—	—	—	with Hbl.	Acc.	—	Acc.	7	Bio.-Hbl. Qz. Monzo.
6A-094	68	15	—	15	—	—	Acc.	2	—	—	—	with Hbl.	Acc.	—	—	7	Hbl. Bio. Qz. Monzo.
6A-577R	60		—	—	—	—	—	10	—	—	15	15	—	—	—	—	Granitic Pebble
6A-1172y	2	98	—	—	—	—	4	—	—	—	1	1	—	—	—	—	Granitic Pebble

*All locations given on Map 2429, back pocket.

Abbreviations:
Bio. — Biotite
Hbl. — Hornblende
Qz. — Quartz
Monzo. — Monzonite
Acc. — Accessory amounts

OTHER GRANITIC INTRUSIONS

The only granitic intrusion that is located entirely in the map-area is the circular stock of granodiorite to quartz monzonite in the centre of it which occurs about 1500 m south of the Mine Road, and about 2100 m west of Con Creek. The rocks from this stock are similar in composition and texture to those of the West Onaman Lake Batholith, and in some cases, the samples are almost identical and cannot be distinguished from one another. Modal and partial chemical analyses of three samples from this circular stock are listed in Tables 10 and 11.

On the Auden (Camp 40) Road, west of Martin Creek, and astride the northwestern boundary of the map-area, several outcrops of previously unreported pink-weathering, medium- to coarse-grained granodiorite to quartz monzonite were examined. The outcrops display a hypidiomorphic granular texture with a local foliation, and contain the most abundant distribution of mafic xenoliths of the metavolcanics of the area, which are intruded by this stock. This stock is considered to represent another subcircular stock of which only the extreme northeastern edge occurs in the map-area. The nearest larger granitic intrusion to which it might be connected lies 6.4 km to the west between Martin and North Wind Lakes beyond the map-area. From the staining data, the samples of this intrusion are similar, except for relatively more abundant xenoliths, to the rocks from the West Onaman Lake Batholith and to the stock just described.

Two or three outcrop areas of a medium- to coarse grained biotite and/or hornblende granodiorite to quartz monzonite containing mafic xenoliths were mapped around the northern boundary of the map-area, about 1500 m north of the central north shore of Conglomerate Lake. Thurston (1976, p.37) described pink weathering rocks in which biotite quartz monzonite to granodiorite predominate along the entire course of the North Onaman River in the North Onaman map-area. On the geological map of Onaman Lake (Thurston 1978), outcrops of massive hornblende, and hornblende-biotite, trondhjemite to granodiorite however, are indicated in the area south of the west end of Braidwood Lake, a distance of about 2400 m from the southeastern border of the map. In this part and in the southwestern part (Thurston 1978), about 2400 m southwest of Brennan Lake, where outcrops of massive biotite and biotite-hornblende trondhjemite and granodiorite are indicated, the contacts strike southeast and southwest respectively toward the southern border. These contacts are interpreted to converge in the map-area in the area previously mentioned.

Minor felsic intrusions of narrow and irregular apophyses of quartz and/or feldspar porphyry, pegmatite, aplite, and felsite, all coded as unit 5k, are distributed in the four granitic and three gabbroic-dioritic intrusive bodies and because they are intrusive into the larger intrusive bodies, these rocks are most probably associated with these major igneous intrusions. All of the apophyses emanating from the granitic intrusions were identified by staining as granites *sensuo stricto*. Only a few apophyses in the gabbroic-dioritic intrusions were found to be true granites, the remainder were found to be syenodiorite and granodiorite in composition. These rocks were not studied in thin section.

METAMORPHISM AND STRUCTURE OF INTERMEDIATE TO FELSIC INTRUSIVE ROCKS

The metamorphic mineral assemblage of quartz + albite + epidote + chlorite ± biotite ± hornblende ± sphene ± carbonate characterizes the lower to middle subfacies of greenschist facies metamorphic rank, similar to most of the Archean rocks of the map-area and of the adjoining areas.

Several structural features occur in all the intrusive rocks which might indicate their mode of formation. Some of these features have already been mentioned, but are summarized here:

1) The most obvious feature is the parallelism of the foliation and bedding to the outlines of the intrusive bodies.

2) Extensive zones of xenoliths are present, and the occurrence of hybrid rocks in certain areas of all intrusions has been interpreted by Moorhouse (1938, p.17) as follows:

> Good evidence that the slope of the contact between the granite (non *sensuo stricto*) and the older rock is rather gentle. A notable exception is the small one south of Conglomerate Lake ... it has been faulted up above its original position in the crust.

Several xenoliths were recognized in the outcrops of this subcircular intrusive body, but these were comparatively fewer than those of the other bodies. It should be pointed out that the gabbro-diorite stocks fit this condition. The varying distribution of the xenoliths and hybrid rocks has been ascribed by Moorhouse (1938) to the possibility that:

> The top of the granite batholith that underlies the area as a whole has an uneven upper surface. The present plane of erosion has intersected this surface wherever granitic rocks are now exposed.

3) Another distinctive feature of the Conglomerate Lake area and the adjoining areas, especially that to the north, is the tendency of the foliation or shearing of the metavolcanics to "wrap around" the intrusive stocks. This phenomenon and the fact that the phenocrysts in the local porphyritic zones and in the porphyritic apophyses are stretched into ellipsoidal shapes give the indication (Moorhouse 1938, p.17);

> That the rocks into which they were intruded were at the time of intrusion in a yielding, almost plastic state and under considerable stress.

4) Local *lit-par-lit* structure is common near the metavolcanic-granitic contacts in the larger batholiths.

5) As was previously stated, besides the metavolcanic inclusions in the batholiths, the gabbro-diorite intrusions contain islands of mafic metavolcanics irregularly distributed throughout the intrusions. Zones of granodiorite, syenodiorite, and granite material are also randomly intrusive into the intrusions. It is proposed by the author that these features are consistent with the interpretation that the intrusion is the upper contact phase of an underlying composite mass of batholithic "granite", as yet unexposed by erosion or uplift, the greenstone areas being possible remnants of roof pendants.

6) Two hybrid-types of rock are randomly distributed astride the contacts between the intrusive rocks with the country rocks. The granites are probably formed in part by stoping and assimilation of the country rock by the invading magma, but the intrusive breccias are most likely crushed rocks in the fault contact areas.

MIDDLE TO LATE PRECAMBRIAN (PROTEROZOIC)

Mafic Intrusive Rocks

DIABASE DIKES

Only about five major diabase dikes were mapped in the area, and all of them are orientated about due north. Most of the dikes form conspicuous erosional ridges which show as easily recognizable linears across aerial photographs. They could neither be recognized on the aeromagnetic map 2136G (ODM-GSC 1963), nor on the high resolution aeromagnetic maps 20105G, 20106G, 20109G and 20110G (ODM-GSC 1974a, 1974b, 1974c, and 1974d).

In the map-area, the diabase dikes average 60 m in width, and can be traced along strike for variable distances. The longest dike traced is 6.4 km long, and is located on the northwest corner of the map-area, and is indicated to have been offset in two localities. It is possible that this dike is the northern extension of a texturally and mineralogically similar dike reported by W.O. Mackasey (1975). Smaller or narrower dikes are few in the current map-area.

Where exposed, most of the diabase dikes are observed to be chilled against the rocks which they have intruded. The black green to dark grey fresh surfaces of the rocks weather to reddish and dark brown tints and most of them are homogeneous in texture, being massive, invariably porphyritic. Plagioclase phenocrysts are as much as 1.3 cm and range in grain size from being aphanitic in the chilled margins to medium grained (3 mm). The longest dike is megaporphyritic (greenspar). The grain size is nearly always determined by the dike width where they are thinner than 3 m, the dikes are nearly always finer grained.

In thin section, diabase is a "fresh-looking" rock with well preserved diabasic textures in which augite and diopside grains are interstitial between randomly oriented subhedral to euhedral laths of labradorite (30 to 60 percent) and occur in approximately equal proportions. A few larger clinopyroxenes partly contain plagioclase grains. The clinopyroxenes are partly altered into chlorite, biotite, and uralite; plagioclase is only slightly altered to sericite and carbonate. Other minor and accessory minerals observed in thin section include hornblende, quartz, magnetite, ilmenite, other opaque minerals, and apatite. Primary olivine was not observed.

Modal analyses of eight diabase samples are given in Table 12.

TABLE 12 | MODAL ANALYSES OF DIABASE SPECIMENS FROM CONGLOMERATE LAKE AREA.*

		Field Number						
	L1	6A1111-4 1	6A1088-2 2	6A584 3	6A500-1 4	6A506-1 5	6A515-3 6	6A613-1 7	6A1199-1 8
Plagioclase	—	50	30	—	20	25	64	—	64
Labradorite	62	—	—	55	40	30	—	50	—
Biotite	1	—	—	—	—	—	—	—	—
Hornblende	1	—	—	—	—	8	8	—	—
Orthopyroxene	—	—	—	—	—	—	—	—	—
Augite	29	—	68	—	—	—	—	—	—
Diopside		30		42	25	35	25	33	35
Olivine	3	—	—	—	—	—	—	—	—
Magnetite	2	—	—	—	—	—	—	—	—
Ilmenite	2	—	—	—	—	—	—	—	—
Apatite	—	—	—	—	—	—	—	—	—
Sphene	—	—	—	—	—	—	—	—	—
Sericite	—	17	—	—	12	—	—	15	—
Chlorite	—	—	—	—	—	—	—	—	—
Uralite	—	—	—	—	—	—	—	—	—
Carbonate	—	—	—	—	—	—	—	—	—
Opaque		3	2	3	3	2	2	2	2

*All locations are given on Map 2429, back pocket.
L1 Average Diabase, Larsen (1942).

Phanerozoic

CENOZOIC

Quaternary

PLEISTOCENE

The Pleistocene geology of the area has been described by S.C. Zoltai (1967) who suggested that several glacial advances modified the Precambrian topography. The record of the movement of the ice is preserved throughout the map-area. The trend of ice movement interpreted from observations made of glacial striae in the map-area and shown on Map 2429 (back pocket) is southwesterly, ranging from azimuths 245° to 265°. The fact that Pleistocene glaciation has modified the Precambrian topography is affirmed by the fact that most of the outcrops are elongated along these azimuthal directions. The Pleistocene deposits are extensive in the map-area. The deposits are thoroughly described by W.W. Moorhouse (1938, p.4) as follows:

> **Depositional Features**
>
> The Pleistocene glaciation left a cover of ground moraine, terminal moraine, esker, outwash, and lake clays over the area. These deposits are of varying thicknesses.
>
> The mantle of till, which is probably the most extensive of the above types, is generally greyish and silty and contains varying quantities of boulders and pebbles. Its appearance suggests that it has been markedly modified by water.
>
> The most distinctive terminal moraine may be traced from a point a mile [1.5 km] west of mile LVII on the Nipigon Provincial Forest boundary westward to Con creek; and it probably continues to the point where heavy glacial deposits are found just south of Conglomerate lake. A large sandy outwash plain extends south from the foot of the moraine. Other thick accumulations of drift, often of a morainal nature, are found throughout the area.
>
> Eskers are not uncommon and frequently parallel the courses of the present streams. Ridges of fine silt, resembling eskers, are abundant in the southwest bay of Onaman lake.
>
> Varved clays are found along the Onaman river. Exposures west of Conglomerate lake are somewhat oxidized and consist of light yellowish bands, one-half [12.7 mm] to 2½ inches [6.3 cm] thick, alternating with dark-buff bands having a uniform thickness of half an inch [12.7 mm]. Similar clays may be seen on Castlewood creek near its junction with Martin creek. Coarsely varved, contorted clay was also noted in trenching west of Conglomerate lake, some distance south of the Onaman river. The presence of these clays, and the prevailing monotonous topography in the northwestern part of the area, suggests that this section, with a strip extending up the Onaman river, was covered by a post-glacial lake.

RECENT

Three types of recent deposits occur in the map-area. Fluvial deposits of clays and silts derived by the action of active rivers eroding their banks are local-

ized in valleys of large rivers such as Onaman River and Pinel Creek. Where smaller creeks and rivers empty into larger rivers and lakes, lacustrine or lake deposits are formed. A number of lacustrine clay, silt, and sand deposits were observed in the southern part of the map-area. Organic mud is continuously being deposited in swamps, muskegs, and shallow lakes. Two types of swamp and muskeg deposits are represented in the map-area. These are: low, spongy land, generally saturated with moisture, spatially studded with trees and aquatic vegetation which occurs in the northwest corner, and peat deposits composed of dark organic mud produced by the partial decomposition and disintegration of moss, trees, and other aquatic plants which are common throughout the map-area.

CORRELATION BETWEEN GEOLOGY AND GEOPHYSICS

A cursory examination of aeromagnetic map 2136G, the North Wind Lake Sheet (ODM-GSC 1963) the high resolution aeromagnetic maps 20105G, 20106G, 20109G, 20110G (ODM-GSC 1974a, 1974b, 1974c, and 1974d) and the accompanying map (Map 2429, back pocket) reveals the following features:

1) A nearly exact outline of the Crooked Green Lake and Boundary Intrusions;

2) A uniform wide spacing of magnetic contours between 60,380 to 60,400 gammas in the central part of the map-area where mafic flows and tuffs are predominant. The Castlewood Creek Intrusion, the most prominent feature of the central area, is marked by closely spaced variable magnetic contour patterns ranging from 60,340 to 60,460 gammas;

3) The area south of Conglomerate Lake contains a magnetic anomaly in excess of 61,000 gammas that strikes due east in a zone approximately 3.2 by 1.2 km. This zone includes the old Kenty prospect. The area has scarse outcrop exposure;

4) The small iron formation area in the metasediments to the west of Con Creek is outlined by a 120 gamma increase above the 60,500 gamma background.

Five areas of high magnetic intensity are located;

1) 910 m west of the north end of Crooked Green Lake; a pyritiferous quartz vein containing minor chalcopyrite was examined in this area.

2) Eight hundred metres northeast of Alma Lake;

3) 4.8 km northwest of Castlewood Lake where Castlewood Creek makes a southern bend. Outcrops are rare in this area;

4) In the old Kenty Prospect (see section "William Z. Langridge (14)") about 1.6 km south of the east end of Conglomerate Lake where silicified shear zones containing pyrite-gold-molybdenite mineralization were reported by Gledhill (1925, p.82);

5) In the area 2.5 km southwest of the little lake in the northeast corner of the map-area. In this area, galena-sphalerite-chalcopyrite-silver mineralization is reported (see section "Nolan Cox (9)") and the showing has been investigated repeatedly since the 1930s;

6) The western edge of the West Onaman Lake Batholith is almost closely outlined by the 60,460 gamma contour.

STRUCTURAL GEOLOGY

The Conglomerate Lake map-area and the Onaman map-area (Thurston 1976) contain a northeast-trending metavolcanic-metasedimentary belt which joins the east-west Beardmore-Geraldton Metavolcanic Metasedimentary Belt (Pye *et al.* 1966; Mackasey *et al.* 1974) and the Tashota-Onaman Belt (Amukun 1977). The Precambrian rocks of the three areas form part of the Wabigoon Belt, a major subdivision of the Superior Province in the Canadian Shield.

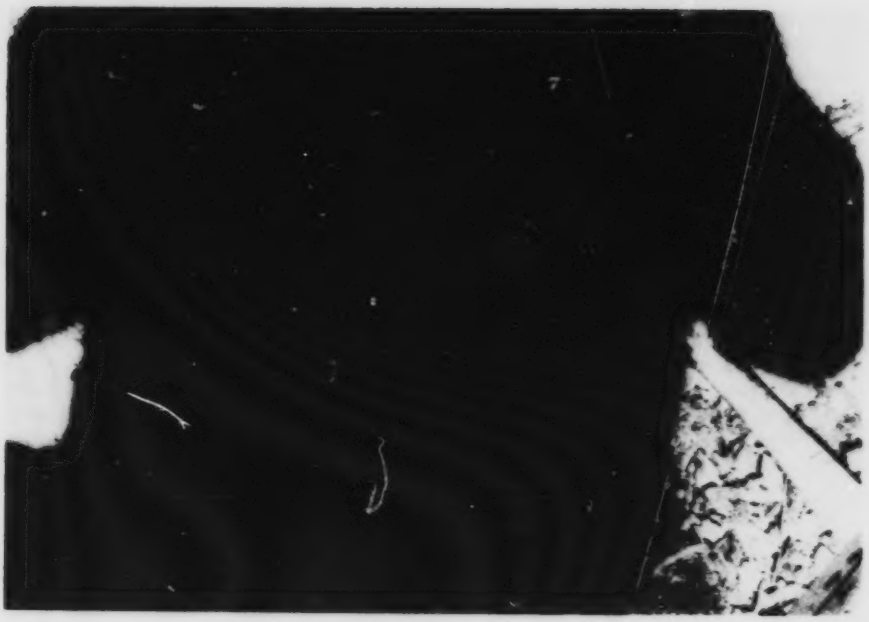
Like some of the rocks in the surrounding country, the Conglomerate Lake Area rocks have been deformed by isoclinal folding and tilting into steep-dipping units. The predominant regional structural trend is east, but within the map-area major lithologic units also locally trend east-northeast and north-northwest.

Foliation, Schistosity, Cleavage, and Lineation

Foliation is evident in some of the metavolcanics and locally in certain intrusive rocks. The foliation is defined by an alignment of micas and other platy or acicular minerals such as chlorite and hornblende in the mafic metavolcanics, and by a parallel elongated arrangement of ferromagnesian and feldspar mineral grains in the granitic rocks. Foliation is also developed in some outcrops of the metavolcanics as a result of stretching of pyroclastic fragments (see Photo 4) and by flattening of pillows into ellipsoidal or oval shapes (see Photo 1), in which the long axes of the fragments and pillows nearly always parallel the regional trend. Thurston (1976, p.45) also noted stretched xenolithic inclusions in the granitic rocks. In the map-area, outcrops of the bedded rocks display zones where foliation obliquely intersects bedding at small angles (5 to 15°). In one outcrop of an extensively sericitized feldspar porphyry located 910 m southwest of the Castlewood Lake-Con Lake Road junction near the east margin of the map-area, an intersection between a strong regional and earlier foliation at about 135° and a later, weaker cleavage at about 90° produced a pronounced crenulation (Photo 10) accompanied by alteration of the rock into a sericite schist.

A weak mineral alignment trending at about 310° is also present in these outcrops. A variable lineation having a similar trend is also present in most of the foliated coarse pyroclastic rocks of the map-area, and is produced by the intersection of the planes of foliation and elongation of the fragments.

In the outcrops mentioned above, a cross-cutting cleavage is also present (Photo 10). Elsewhere in the map-area, for example on the mafic tuff outcrops exposed along the road that joins Castlewood Lake and the Mine Roads, cleavage is present on the limbs of a tight minor fold (Photo 11) and has a secondary minute folding (kink crenulation) superimposed on it (Photo 11).



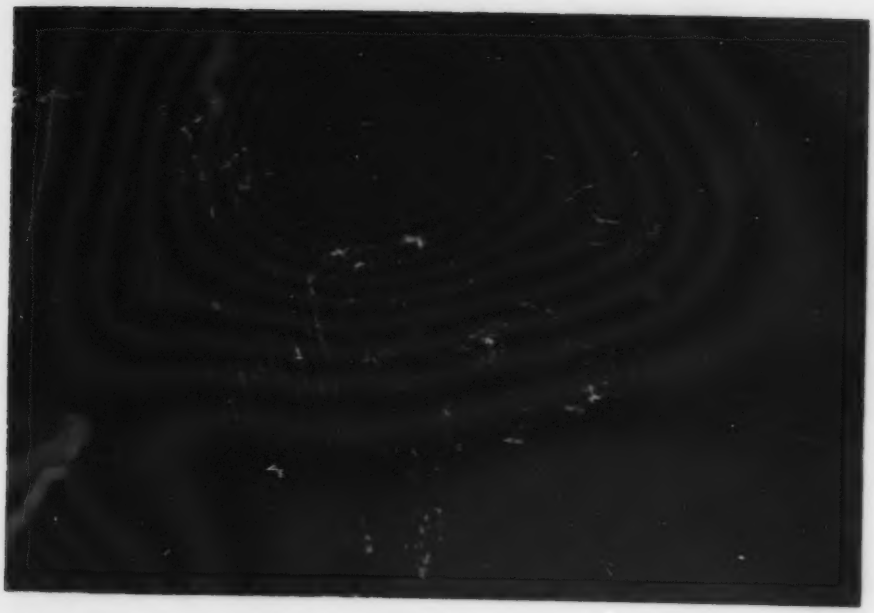
OGS 10 108

Photo 10–Crenulation cleavage produced by an intersection between two foliations in outcrops located about 915 m southwest of the Castlewood Lake road–Con Lake Junction.

On Map 2429, back pocket, one non-genetic symbol (foliation) is used to denote all rock cleavages caused by metamorphism and includes fracture cleavage, flow cleavage, slaty cleavage, and schistosity. Three locations in the map-area are particularly severely sheared: a) the area south of Conglomerate Lake (see "Economic Geology", Amede Lafontaine (13)); b) in the northeast corner; and c) on the east-central edge. In all of these areas, porphyry dike emplacement accompanied by silicification and carbonatization are invariably associated with the shear zones. This feature is also noted by Moorhouse (1938, p.15) elsewhere in the map-area.

Folding

Evidence for the recognition of traces of axial planes of major folds in the map-area is lacking or contradictory. Because of the lack of marker units and the scarcity of outcrops, the author supports Moorhouse's (1938, p.15) study. This study speculated that the rocks were subjected to isoclinal folding and were tilted into steep dips with little divergence so that it was difficult to locate major



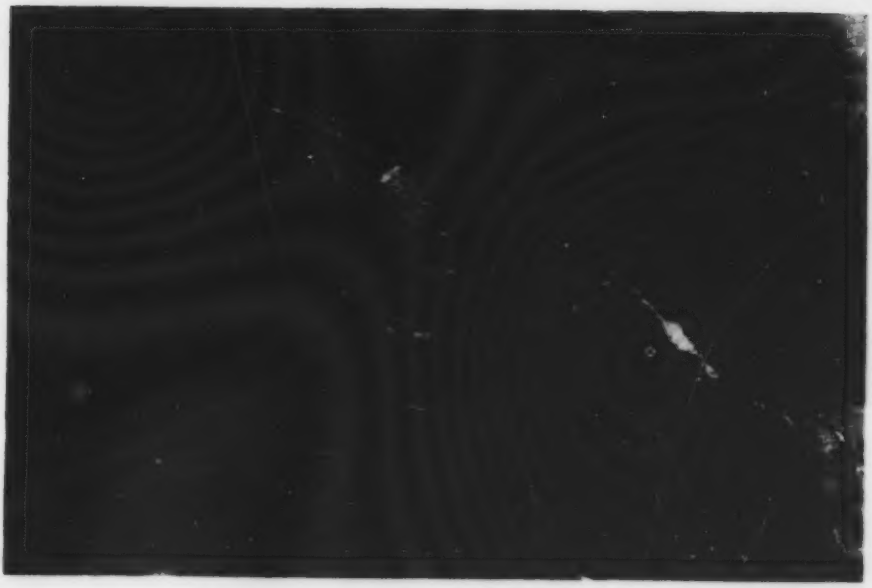
OGS 10 109

Photo 11–A tight minor fold with secondary minute folds. (Kink crenulation) superimposed on the limbs, in outcrops along the road that joins Castlewood Lake and the Mine Roads (Photo by John C. Scott).

folds. Although several dragfolds were recognized by Moorhouse (1938), the field party was only able to locate one exposure of a drag fold attributable to plastic deformation (Photo 12). This outcrop is located in the same locality as the tight minor fold with secondary kink crenulation (see Photo 11). Several intrafolial "kink" folds related to faulting events were observed in the tuffs. The "kink" folds are not related to the major folds. Using evidence gleaned from the study of drag folds, fracture cleavage, and bedding in the area on the south shore and east of Conglomerate Lake, Moorhouse (1938, p.16) proposed a faulted, synclinal feature in the sedimentary unit:

> It is thought, however, that the sediments occupy a faulted, synclinal zone. This is the type of structure in which the [Keewatin] and [Timiskaming] commonly occur. The chief evidences for this are several dragfolds near and in the zone and the presence of fragments of Keewatin in the sedimentary rocks. In the Timiskaming along the south shore of Conglomerate lake, a band of rusty, cherty quartz near the south contact of the sediments is overlain to the north by a bed containing pebbles of the same material, indicating that the tops of the beds face inwards towards the centre of the sedimentary belt. The relations of fracture cleavage and bedding east of Conglomerate lake confirm this evidence.

It should be pointed out that the drag fold observed during the current survey occurs neither in the sedimentary unit nor in the "nose" of Moorhouse's



OGS 10 110

Photo 12–Drag folding produced by plastic deformation in outcrops along the road that joins Castlewood and the Mine roads.

faulted syncline(Moorhouse 1938, p.15). The "rusty, cherty quartz near the south contact of the sediments ... overlain to the north by a bed containing pebbles of the same material, indicating ... tops (to) face inwards ..." (Moorhouse 1938, p.15) was not located by the field party. A major syncline that might support this observation was interpreted to exist in the vicinity of MacDonald Lake 3.2 km along strike with the Conglomerate Lake metavolcanics (Thurston 1976). This seems to establish a syncline in the east-striking unit that nearly parallels the Onaman River system, but not in that unit which nearly parallels Con Creek. In the survey, crossbedding, graded bedding, and pillow top determinations do not indicate a syncline in the Con Creek unit. The unique L-shape or "chevron" fold outlined mainly by outcrops of the metaconglomerate unit is not therefore confirmed by any other visible criteria. Furthermore, there is a subtle difference between the conglomerate units in the two limbs. Although only scattered exposures are present, the Conglomerate Lake unit is predominantly matrix-supported, but that along Con Creek is clast-supported. In addition, in the area, the stratigraphy on the limbs of the L-shaped fold does not appear to match. Along Con Creek, flow and tuff units are present; these units do not appear on the north limb, despite the near right-angle turn in foliation. The Conglomerate Lake unit was possibly derived from a stream deposit (mud flow), while the Con Creek unit may have been locally derived from a predominantly

granitic terrain. Angular iron formation pebbles were not observed in the Conglomerate Lake Unit.

Faulting and Shearing

Areas of intense shearing and of lithologic off-sets (see Map 2429, back pocket) occur in the map-area. These can be traced as lineaments and linear drainage patterns: 1) along Conglomerate Lake where Moorhouse (1938, p.16) also observed slickensides on the steep cliff walls on the north shore; and 2) along the granite greenstone contact at the northeast corner of the map-area where a stream parallels it and sheared rocks are present on either side of the contact.

Joints

Joints are ubiquitous in all rock types, but are best developed in the diabase dikes and the granitic rocks. The main directions of their strike are recorded and are plotted on Map 2429, back pocket. Four major joint sets with different strike directions were reported by Thurston (1976, p.46) for the adjoining rocks to the north.

ECONOMIC GEOLOGY

Economic mineral deposits have not been found in the Conglomerate Lake map-area, but the area contains anomalously high amounts of silver, copper, lead, zinc, and indications of gold, molybdenum, and nickel. The Conglomerate Lake Area is peripheral to two mining areas and much of the prospecting in the map-area has resulted from these. The "Tashota-Onaman-Kowkash gold area" to the north was initially investigated for iron deposits in 1904. This area was subsequently explored for gold and base metals in the late 1910s following completion of the Canadian National Transcontinental railway line through it and also in the early 1930s and 1950s (Amukun 1977; Thurston 1976). The "Sturgeon River Gold Belt" to the south has likewise been the focus of extensive exploration activity which started in the 1920s after gold was discovered in the Beardmore area in 1925 (Mackasey and Wallace 1978). Although base-metal sulphides were recognized during each gold rush period, exploration for base metals did not occur until the late 1940s for the area to the south (Mackasey and Wallace 1978, p.76), and until the early 1950s for the area to the north (Thurston 1976, p.50).

Most mineral exploration in the Conglomerate Lake area is related to:

(a) The discovery and subsequent development of a gold-copper-silver orebody (Thurston 1976) by Tashota-Nipigon Mines Limited, located 6.4 km northeast of the northeast boundary of the map-area;

b) The discovery and subsequent exploration of the Coulee Lead and Zinc Mines Limited and Headway Red Lake Gold Mines Limited depos-

its of silver, zinc, and lead (Thurston 1976) mineralization located 0.8 km northeast of the map-area;

c) The discovery and exploration (Mackasey and Wallace 1978) of a copper-nickel deposit located 0.8 km south of the south-central part of the map-area by Chesterville Mines and Jacobus Mining Corporation Limited (Jacobus Copper Nickel Prospect (Chesterville Mines Prospect) (12)).

Following the discovery of gold and base-metal prospects in the surrounding country, prospecting and staking activity spilled over into the current map-area. Several mineral showings were discovered in the Conglomerate Lake map-area, and some of these have been re-examined sporadically since the early 1920s (see Table 13).

During the geological survey of the area, many selected grab samples of the best mineralized material, 50 in all, were taken from several trenches and pits located in several showings. These samples were submitted for metal assays at the Geoscience Laboratories, Ontario Geological Survey. Information on mineral occurrences of the area which have been sampled and on those which have not been investigated is used in an attempt to determine lithologic metalliferous associations in the map-area.

Mineral Exploration

In 1916, Gregory Brennan panned gold from oxidized outcrops containing galena and sphalerite on claim KK4722 in the area known as the Coulee veins 2 and 4, 1.6 km northeast of the map-area, and claims were subsequently staked to procure this and the adjacent ground in 1922 (Thurston 1976, p.58). This area overlaps into the map-area, and comprises the Coulee Lead and Zinc Mines and the Headway Red Lake Gold Mines deposits. These properties were acquired by a syndicate comprised of Lynx-Canada Explorations Limited, Dejour Mines Limited, and Canadian Reynolds Metals Company Limited by option in July 1975 from Coulee Lead and Zinc Mines Limited, Headway Red Lake Gold Mines Limited, and Carndesson Mines Limited (Thurston 1976, p.90); (in this report called the Lynx-Canada-Dejour-Canadian Reynolds Syndicate (15)).

By 1924 interest in the region had spread as far west as the present bridge across the Onaman River which is outside the map-area, and as far south as Mileage 56 (89.6 km) on the east boundary of the Nipigon Forest Reserve line. In 1924, a gold-molybdenite showing was discovered by the Kenty brothers (Gledhill 1925, p.82) about 1.5 km south of the east end of Conglomerate Lake. This showing was acquired by William Langridge Jr. in the 1950s and is now owned by William Z. Langridge. Also in 1924, Messrs. Wells and Johnson discovered gold with sphalerite, chalcopyrite, and galena in quartz veins west of the main granite-metavolcanic contact, west of Mileage 57 (91.2 km) on the Nipigon Forest Reserve line (Gledhill 1925, p.81). This showing, locally known as the Con Creek Showing is now covered by four claims registered to Nolan Cox (9).

During the late 1940s to early 1950s, a shift in exploration emphasis was directed towards base metals. In 1947, a copper-nickel showing was discovered in a gabbro-diorite body located 0.8 km south of the south central boundary of the

TABLE 13 | SUMMARY OF ASSESSMENT RECORD FOR CONGLOMERATE LAKE AREA AS RECORDED WITH THE ONTARIO GEOLOGICAL SURVEY.

Number of Property, Deposit[1] or Unclaimed parcel of Land.	Type of Survey	DDH Number of Holes:	total footage	Year/ File Number
1. Amax Explorations Inc. [1972]	ABEM, Mag, EM Geol., Geochem.	1	256	1972/63.3060
4. Bonnie Gold Mines Ltd. [1972]	Mag.	2	1994	1952/63.354
5. Hudson Bay Explor. & Dev. Co. Ltd.	Mag., EM	4	2043	1971/2.810
	EM	4	2331	1972/63.3054
6. Rouandah Gold & Metals Ltd. [1952]	Mag.	—		1952/63.284
6. Palomino Explorations Ltd.	Mag., EM, ABEM	2	1007	1967/63.2242
6. Geophysical Engineering Ltd.		3		1975/19,20
7. Coniagas Mines, Ltd. [1952]	Mag.	—		1952/63.341
9. New Bidlamaque Mines Ltd.	Mag., EM, Mech.	6	2079	1960/63.1042
9. Shawmin Exploration Ltd.	EM	4	520	1973/2.1475
12. Jacobus Mining Corporation Ltd. (map-area only)	Geol., Geochem., IP EM, Mag., Mech.	57	29255	1957-72/63.947 63.2676 2.743
13. LaFontaine, Amede (Coniagas Mines, Ltd. [1952])	EM	—		1952/63.295
14. Langridge, Wm. Z. (Kenty showing)	Mech., EM			1952/63.324
		3	1375	1955/10
(Chontor Occur.)	Geol., Mag.	5	1070	1960/10
(Jorsco Expl. Ltd.)	Mag.	—		1962/63.1155
(Jorsco Expl. Ltd.)	Mag.	—		1962/63.1167
(Jorsco Expl. Ltd.)	—	4	2153	1962/12
15. American Metal Co. of Canada [1948]	EM	—		1948/63.A28
15. Palomino Explorations Ltd.	ABEM, EM, Mag.			1967/63.2242
		1	500	1967/13
15. Noranda Explorations Ltd.	Geol., Geochem., Mech.			1973/63.3051
	ABEM, Mag., EM	2	600	1973/63.3051
16. Rouandah Gold & Metals Ltd. [1952]	Mag., EM	—		1952/63.285

Table 13 continued

Number of Property, Deposit[1] or Unclaimed parcel of Land.	Type of Survey	DDH Number of Holes: total footage	Year/ File Number
16. New Bidlamaque Mines Ltd.	Mag., EM, Mech.	—	1960/63.1042
17. Palomino Explorations Ltd.	Mag., EM, ABEM	—	1967/63.2242
17. Geophysical Engineering Ltd.	—	1 507	1967/3
		1 108	1975/20

Abbreviations:
Type of Surveys:
ABEM — Airborne Electromagnetometer
EM — Electromagnetometer
Mag. — Magnetometer
Geol. — Geological
Geochem. — Geochemical
IP — Induced Polarization
Mech. — General Surface Mechanical
DDH — Diamond-Drill Hole
Occur. — Occurrence

To metricate: multiply feet by 0.3048 to obtain metres
1The numbers of these properties, deposits do not necessarily correspond with the list given in Map 2429.

map-area by Christianson Prospectors Syndicate (Mackasey and Wallace 1978, p.116). Chesterville Mines Limited and Jacobus Mining Corporation Limited conducted an exploration program on this property between 1957 and 1972 and outlined a small tonnage deposit of copper-nickel mineralization.

In 1959, exploration was resumed on the "Con Creek Showing" by New Bidlamaque Mines Limited, but apparently the ground was abandoned after the completion of the exploration surveys.

Also in the 1950s, extensive exploration surveys were conducted by Headvue Mines Limited, Coulee Lead and Zinc Mines Limited, and Headway Red Lake Gold Mines Limited in the area around the original Brennan "find" of 1916. These surveys culminated in the discovery of a small tonnage deposit of lead-zinc-silver mineralization (Thurston 1976).

Some exploration activity was recorded in the area during the 1960s probably because of the improvement of exploration methods, especially of geophysical surveys, and the rise in metal prices.

Recent exploration activity was conducted between 1971-1974 by Noranda Exploration Company Limited, who re-examined the "Headway" and "Coulee" prospects in detail. Their exploration surveys covered a major part of the northeast corner of the map-area (Assessment Files Research Office, Ontario Geological Survey, Toronto). In 1973 Shawmin Explorations Limited conducted an exploration survey on the ground covering the "Con Creek Showing". In 1972, Amax Exploration, Incorporated investigated the area around the Castlewood Lake area in search of base metals, while Hudson Bay Exploration and Development Company Limited conducted exploration surveys in the Grasser Lake area in the same year, also in search of base metals (Assessment Files Research Office, Ontario Geological Survey, Toronto). In 1974-1975 Conwest Exploration Company Limited was investigating the gold mineralization in a granitic stock in Elmhirst Township and in the adjacent Wedlock-Pinel Lakes within the map-area (K. Fenwick, Regional Geologist, Ontario Ministry of Natural Resources, Thunder Bay, personal communication, 1976).

During the 1976 field season, the syndicate led by Lynx-Canada Exploration Limited was conducting diamond drilling, prospecting, and geological-geochemical-geophysical surveys on the ground they held, which covered the northeast corner of the map-area. More diamond drilling was anticipated after the field season. In the course of the prospecting, a molybdenum showing occurring in "pebbles" of a narrow conglomerate-looking unit was located at about 3.2 km east of the map-area. A new copper-silver-zinc deposit was also found and diamond-drilled 2.4 km east of the map-area. Amoco Canada Petroleum Company Limited conducted geological-geophysical surveys on the Ouellet Option located north of Conglomerate Lake.

Mattagami Lake Mines Limited was also conducting geological geophysical surveys on their ground located outside the map-area, north of the Lynx-Canada-Dejour-Canadian Reynolds Syndicate (16) property.

During the 1976 field season, mining claims covered most of the northeast corner of the map-area, and some claims covered the Hindson-Wedlock-Pinel Lakes area in the southeast-central part of the map-area.

Mineral Occurrences

LEAD, ZINC, AND SILVER

The occurrences of lead, zinc, and silver with or without copper and gold are restricted to felsic pyroclastic rocks which are rare in the map-area. In the adjacent South Onaman area, Thurston (1976), however, reported a narrow unit of felsic metavolcanics trending northeast just south of the Onaman River and extending up to a point only 200 or 300 m north of the map-area. A few outcrops of this unit were also mapped by Thurston (1976) 200 or 300 m east of the northeast boundary; the unit could probably extend into this part of the map-area underneath the extensive sand and clay deposits.

The Headway Red Lake Gold Mines and Coulee Lead Zinc Mines deposits (outside the map-area) are good examples of lead, zinc, and silver mineralization

TABLE 14 | ASSAYS OF MINERALIZATION IN QUARTZ VEIN FROM FELSIC METAVOLCANIC GRAB SAMPLES.*

Sample Number[1]	Percent Pb	Percent Zn	Percent Cu	Ounce of silver per ton	Ounce of gold per ton
1	0.56	5.34	0.01	35.26	2.08
2	0.24	1.82	trace	2.04	0.08
3	0.05	3.83	0.05	0.24	trace
4	0.12	0.30	0.01	0.49	0.01
5	3.90	1.73	0.05	6.91	0.05
6	0.14	2.40	0.05	2.01	0.09
7	0.14	trace	0.37	1.01	0.01
8	4.82	0.29	trace	5.19	0.01

* Assays by Geoscience Laboratories, Ontario Geological Survey.

[1] For locations see Map 2429, back pocket.

with or without copper and gold mineralization in felsic pyroclastic metavolcanics, and occur only within 3 km north of the northeast corner of the map-area. The type and nature of sulphides containing mineralization has been reported by Thurston (1976, p.52-53). Several felsic metavolcanic dikes probably related to felsic vulcanism are located in and to the north of the map-area and are intruded by quartz veins containing disseminated sulphides. The sulphides contain lead, zinc, and silver with or without gold and copper. Several trenches located in two of these dikes were sampled. The first dike is located outside the map-area, but was not reported by Thurston (1976), and is on a logging road branching northerly off the Tashota Nipigon Mine road, 3.6 km west of the Tashota Nipigon Mine within ground held by the Lynx-Canada-Dejour-Canadian Reynolds Syndicate (15). This quartz-feldspar porphyry dike is 30 m wide, is highly sheared, silicified, carbonatized, and altered to a sericite schist in places. The dike contains disseminated to massive minerals including pyrite, pyrrhotite, fuchsite, sphalerite, and galena along foliation planes. Minor amounts of copper and gold occur with sulphides of the above mineralization (see Grab samples 1-6, Table 14). The second sampled dike is located in the map-area (see locality 7-8 on Map 2429, back pocket). Here, a sheared quartz-feldspar porphyry dike 15 m wide contains quartz veins that host pods of sulphides that include visible pyrite, sphalerite, galena, and chalcopyrite, and minor amounts of gold (Grab samples 7-8, Table 14).

The origin of lead-zinc-silver deposits in felsic pyroclastic rocks and the sulphide minerals or materials associated with them can be explained by a number of theories. The deposits exhibit, in the author's opinion, the following epigenetic and syngenetic characteristics:

a) Sulphides are exclusively confined to hosts composed of intermediate to felsic metavolcanics or quartz veins within these; the major showings

are restricted to pyroclastic metavolcanics, and include some "mill rock" (Sangster 1972).
b) A thick massive sulphide unit is interbanded with the felsic metavolcanics (Thurston 1976, p.53), and relatively massive sphalerite, galena, and pyrite pods in quartz carbonate veins occur in felsic tuff units in the Headway Main, Main South, and Main West zones, and in quartz eye porphyry sills in most of the "Coulee" zones (Thurston 1976, p.52-53);
c) Scattered syngenetic sulphides in concentrations up to 10 percent are often found in the felsic metavolcanics, and contain similar mineralization to the major prospects;
e) Undisputable fumarolic and/or exhalative units such as chert, oxide facies iron formation, carbonate rocks, and framboids have not been found in association with the felsic metavolcanics and the mineralization;
f) No bedding and no consistent stratigraphic control of the mineralization is recognizable in the known major prospects;
g) Scattered mineralization, mostly pyrite and pyrrhotite coats fractures and shears, and metavolcanic-granitic lithologic contacts which may have been introduced hydrothermally either from primary magmatic solutions or by lateral migration (leaching) of the volcanic country rocks.

COPPER, SILVER, AND GOLD

The occurrence of this type of deposit in the map-area and the adjoining region is variable with regard to mineralization and the type of host rock.

Deposits in Mafic Tuffs and Marble

The "number one" showing of Lynx-Canada-Dejour-Canadian Reynolds Syndicate (just outside the map-area) does not outcrop, but has been diamond drilled in detail by the syndicate (Thurston 1976, p.90-91; and Rick Rutledge Geologist with Lynx-Canada-Dejour-Canadian Reynolds Syndicate, personal communication, 1976). The showing appears to be a stratabound copper-silver-gold occurrence bounded by an andesitic tuff (on the footwall) and a brecciated carbonate unit on the hanging wall (Thurston 1976, p.91; and Rick Rutledge, Geologist with Lynx-Canada-Dejour-Canadian Reynolds Syndicate personal communication, 1976). The mafic metavolcanic belt hosting this type of mineralization is described by Thurston (1976) and extends into the map-area. The deposit is interpreted to be a syngenetic deposit of the Maybrun or Coronation mine type by Thurston (1976, p.93) and by Rick Rutledge, personal communication, 1976.

TABLE 15 | ASSAYS OF SELECTED GRAB SAMPLES FROM MINERALIZATION IN NARROW SILICEOUS UNITS MAFIC FLOWS.*

Sample Number[1]	Percent Cu	Percent Zn	Percent Pb	Ounce of silver per ton	Ounce of gold per ton
24	11.6	0.63	0.10	10.92	0.06
25	11.0	0.39	0.10	8.37	0.07
26	9.3	0.61	0.17	8.58	0.04

*Assays by Geoscience Laboratories, Ontario Geological Survey.

[1]Samples located in trenches located about 2.4 km east of the map-area (see text).

Deposits in Mafic Flows

The "number two" showing of Lynx-Canada-Dejour-Canadian Reynolds Syndicate (15) was not examined by the author, but is exposed by a series of trenches. The type of mineralization is described by Thurston (1976, p.92-93) who has suggested that:

> The number 2 showing is probably a remobilized syngenetic deposit associated with the surrounding mafic flows. The trend of the mineralized zone is similar to that of the Cu-rich zone at the Tashota Mine and would suggest that the mechanism of emplacement of the quartz veins and sulphides may be similar.

Although this type of mineralization was not observed in the map-area, the host mafic flows extend into the map-area.

Several narrow siliceous units containing copper, silver, and gold with or without lead and zinc mineralization within mafic flows were discovered in the course of exploration surveys conducted during the 1976 field season by the employees of the syndicate led by Lynx-Canada Explorations Limited. A new massive copper-ailver-zinc deposit was found and drilled about 2.4 km east of the map-area, only 183 m east of the "No.2" showing. The deposit is not exposed, but was discovered by trenching conductors located by geophysical surveys (M. Watson, President of Lynx-Canada Explorations Limited, personal communication, 1976). This showing was visited and sampled by the author (Table 15, sample Numbers 24-26).

During the diamond drilling, a narrow intersection of 0.6 m containing massive chalcopyrite, sphalerite, and pyrite was intersected. This massive mineralized body is fragmental or brecciated in texture and contains sulphides in the following amounts: chalcopyrite 70 to 75 percent, pyrite 15 to 20 percent, sphalerite about 5 percent, galena about 1 percent, and others (such as siliceous materials and inclusions of country rock) about 5 percent, (M. Watson and Rick Rutledge, personal communication, 1976).

TABLE 16 | ASSAYS OF SELECTED GRAB SAMPLES FROM QUARTZ VEIN-TYPE COPPER-LEAD-ZINC SULPHIDE DEPOSITS IN MAFIC METAVOLCANICS.*

Sample Number[1]	Percent Cu	Percent Pb	Percent Zn	Ounce of silver per ton	Ounce of gold per ton
16	0.01	0.08	not detected	trace	trace
17	1.32	0.02	0.15	trace	trace
18	0.94	1.14	22.6	6.79	0.01
19	0.92	1.20	34.6	7.08	0.02
22	1.32	0.06	not detected	nil	nil
23	0.62	trace	not detected	trace	trace

*Assays by Geoscience Laboratories, Ontario Geological Survey.
1For locations see Map 2429, back pocket.

Deposits in Quartz Veins Within Mafic Metavolcanics

Sulphide minerals are found in about 40 percent of the observed quartz veins. In the mineralized veins which have been observed, and are located mainly within the mafic metavolcanics, the sulphides occur in erratic amounts, and generally include only traces of pyrite and pyrrhotite. Chalcopyrite, galena, sphalerite, arsenopyrite, gold, and silver are also common in the area (see Gledhill 1925, p.81-83; Moorhouse 1938, p.21; Mackasey and Wallace 1978; and Thurston 1976, p.88-89). The sulphides in the veins are visible as pods and clasts in lenses up to several centimetres wide and can constitute up to 20 percent of the vein material.

The vein-type sulphide deposits were probably formed relatively late because the veins cross-cut all the Archean metavolcanics in the area.

Assays of six selected grab samples from mineralized quartz veins in the map-area are given in Table 16.

Deposits in Lenticular Felsic Porphyry Dikes Within Mafic Flows

In the northeast part of the map-area, several north-trending quartz-feldspar porphyry dikes were mapped which cross-cut the mafic flows. The mafic flows in which they are intruded are usually sheared and altered into greenschist. The dikes are themselves usually invaded by narrow quartz-carbonate veins several centimetres wide. The quartz carbonate veins invariably contain

TABLE 17 | ASSAYS OF SELECTED GRAB SAMPLES OF MINERALIZED QUARTZ VEINS ASSOCIATED WITH LENTICULAR FELSIC PORPHYRY IN MAFIC FLOWS.*

Sample Number[1]	Percent Zn	Percent Pb	Percent Cu	Ounce of silver per ton	Ounce of gold per ton
1	0.66	0.80	0.31	1.78	0.02
2	3.52	4.04	0.01	8.53	0.03
3	2.00	0.89	1.02	2.15	0.01
4	0.84	3.19	1.02	4.49	0.01
5	1.06	0.89	0.90	2.87	0.01
6	1.42	9.38	0.27	15.14	0.04
7	19.2	1.50	0.21	2.30	0.08
8	0.29	11.4	0.57	16.52	0.02
9	0.48	1.56	0.47	3.77	0.01
10	1.44	0.39	0.82	1.02	trace
11	0.25	3.52	0.95	5.79	0.15
12	nil	3.70	0.20	6.06	0.08
13	17.5	2.50	0.06	3.62	0.02
14	4.50	2.38	0.25	4.11	0.01
15	16.8	7.94	0.13	9.23	0.01
20	0.85	0.01	0.01	0.23	0.01
21	2.77	0.02	0.02	0.22	trace
27	trace	0.14	0.37	0.01	0.01
28	0.29	4.82	trace	5.19	0.01

*Assays by Geoscience Laboratories, Ontario Geological Survey.

[1]For location see Map 2429, back pocket.

pyrite and pyrrhotite, and occasionally base-metal sulphides with or without gold and silver on assay.

The showing locally known as the "Con Creek Showing" (Nolan Cox (9)) was initially staked and prospected for gold in the 1920s and was first described by T.L. Gledhill (1925, p.81) as the Wells and Johnson, T.B.4480 claim.

> Gold values were obtained from quartz veins on this claim lying in much disturbed greenstone schist about fifteen chains [68 m] west of the main granite greenstone contact, west of mileage 57 [91.2 km] on the Reserve line. The minerals noticed are sphalerite, pyrite, chalcopyrite, and arsenopyrite. Cobalt bloom [not observed in the current survey] was found in a diabase dike near these veins.

During the field season, grab samples of the best mineralized material were taken from several trenches located in the "Con Creek Showing", which at the time of the survey were exposed along the Con Lake road system and were submitted for assays (sample Numbers 1-15, Table 17). The showing consists of a quartz-feldspar porphyry zone cut by thin quartz veins 2 to 15 cm wide contain-

ing sphalerite, galena, chalcopyrite, and silver. This mineralization is restricted to highly sheared, sericitized, and sometimes carbonatized north-trending quartz-feldspar porphyry dikes in the northeast part of the map-area. Some of the other related quartz carbonate veins in mineralized zones in the northeast part of the area were also sampled and assayed (sample Numbers 27, 28, Table 17).

During the course of field mapping, a gossan zone was observed by the field party in the area of properties (9), and (20) (Map 2429, back pocket) about 900 m northwest of the "Con Creek Showings". In this area, a carbonatized and sericitized porphyry dike cutting across mafic flows and tuffs is associated with quartz-carbonate zones containing visible but trace amounts of sphalerite and pyrite. Assays of two samples (see sample numbers 20, 21, Table 17) also returned low values of silver.

GOLD

In the map-area, gold occurs with the lead-zinc-silver and copper-silver deposits as previously described, and as reported by Thurston (1976, p.51 and p.206) and Mackasey and Wallace (1978). In addition, gold occurs in the map-area with molybdenite in silicified shear zones associated with lenticular porphyry intrusions and in granitic stocks.

Gold-Molybdenum Deposits

The old Kenty showing (see William Z. Langridge (14)) is the only occurrence of gold-molybdenite mineralization in the area. The prospect is now completely covered by overburden and slash from logging operations and could not be located on the surface by the field party, but Gledhill (1925, p.82) described it as follows:

> Kenty Claim, K.K. 800 and 831. This was the first important discovery made near the Timiskaming sediments which lie south of Conglomerate lake. A trail a mile [1.5 km] long leads south to the discovery from a camp on the south shore of the east end of Conglomerate lake.
>
> The mineralization occurs in the [recrystallized] greenstones [within a series of lenticular silicified shear zones associated with lenticular porphyry] intrusions across a width of 150 feet [45 m]. The greenstones have been much sheared and are for the most part converted into biotite schist. They strike N.80°E. and dip at 85° toward the north, and have been impregnated with finely crystallized pyrite. Parallel-sheeted quartz veins and in places narrow dikes of feldspar split the schist and produce a banded rock resembling a granite gneiss (Figure 8), [Gledhill's report].
>
> The mineralized zone extends east and west with the schistosity strike. The dip is nearly vertical. Recrystallized greenstone bounds the mineral zone on the north; on the south the mineralization can be traced to where the rock is covered by muskeg. The mineralization was no doubt produced from solutions coming from the granite.
>
> Some quartz veins up to three feet [0.9 m] in width lie on the north side of the mineralized belt. Channel samples taken by J. Kenty across 8 to 10 feet [2.4 to 3 m] of mineralized schist carried values ranging from $4 to $14 in gold per ton. Gold pannings were made by the writer in several places on the discovery. Portions of the schist are silicified. Pyrite, molybdenite, and gold appear to be the only ore minerals. Claims lying east and west of Kenty's discovery have mineralized schist which gives gold assays. This part of the camp has an overburden of glacial drift which makes prospecting somewhat difficult.

[Additions within Gledhill's quote are from Moorhouse (1938, p.20)].

Only minor amounts of native gold, molybdenite, and pyrite are reported in the diamond drilling of this property (Assessment Files Research Office, Ontario Geological Survey, Toronto).

Gold Deposits in Granitic Rocks

In 1974-1975 Conwest Exploration Limited (8) is reported (K.G. Fenwick, Regional Geologist, Ontario Ministry of Natural Resources, personal communication, 1976) to have conducted exploration surveys on a large block of claims in the area south of the Wedlock-Pinel Lakes area where a part of the Elmhirst Township granodioritic stock outcrops. Several trenches are reported to expose gold mineralization in quartz veins within the granitic body (K.G. Fenwick, Regional Geologist, Ontario Ministry of Natural Resources, personal communication, 1976). The author did not visit this deposit.

COPPER-NICKEL

In the Pinel Creek Intrusion (Mackasey and Wallace 1978, p.5) there is a gabbro-diorite intrusion that occurs partly in the south-central part of the map-area and contains copper-nickel mineralization. Similar gabbroic/dioritic intrusions informally referred to in this report as the Crooked Green Lake Intrusion and Castlewood Creek Intrusion, do not appear to contain any related copper-nickel deposits. The Pinel Creek Intrusion was interpreted by D. Faust (1973) to be a layered sill-like body, but in the current mapping, it has been suggested along with the other similar intrusions as the upper phases of an underlying granitic stock as yet unexposed by erosion.

The disseminated copper-nickel sulphide mineralization in the Pinel Creek Intrusion "is concentrated in the melanocratic gabbro phase ... near the upper contact of the body" and the deposit is estimated to consist of 937,538 tons of 0.42 percent copper and 0.41 percent nickel (Mackasey and Wallace 1978).

MOLYBDENUM

During the 1976 field season, prospectors employed by the syndicate led by Lynx-Canada Exploration Limited exposed a molybdenum showing occurring in pebbles of a peculiar narrow breccia unit located about 3.2 km east of the map-area. This unit consists entirely of quartz (or chert ?) and granitic fragments or pebbles in a chloritic (volcanic ?) matrix cutting through mafic flows, not too far from a major granitic stock border, and within 30 m of a sulphide facies iron formation. The moderate molybdenum mineralization appears to be restricted predominantly through the quartz (or chert ?) fragments.

The deposit is tentatively considered by the author to represent either a narrow younger pyroclastic (or conglomerate) unit containing pre-mineralized silica-rich and rhyolitic fragments (or pebbles), or a mineralized volcanic vent or pipe forced through enclosing mafic metavolcanic flows by the explosive energy of gas-charged magmas. Mineralization in the diatreme could be derived directly from the gas-charged magmas or from pre-mineralized cherty and rhyolitic country rocks.

PYRITE AND PYRRHOTITE

Concentrations of pyrite and pyrrhotite without significant amounts of associated precious metals and base-metal sulphides occur sporadically in the area. These deposits represent an enrichment of sulphur, which is also a critical element present in the formation of ore deposits. The significant pyrite-pyrrhotite deposits are referred to in this section, but they are described in detail in the property descriptions.

The Palamino Explorations Occurrence within the Rolland Collins (6) property is up to 24 m wide and consists of massive pyrite-pyrrhotite and traces of sphalerite and chalcopyrite in metasediments which were assayed in 1968 and were found to contain an average of 36.4 percent sulphur and 41.6 percent soluble iron (Assessment Files Research Office, Ontario Ministry of Natural Resources, Toronto).

The Hudson Bay Exploration and Development Occurrence [outside the map-area] consists of bands of magnetite, graphite schist, pyrite-pyrrhotite, and trace chalcopyrite that were investigated by diamond drilling in 1972 (Assessment Files Research Office, Ontario Ministry of Natural Resources, Toronto). Several massive to disseminated bands intersected in the drilling contain 15 to 20 percent pyrrhotite, 1 to 5 percent pyrite, and 5 to 10 percent magnetite (Assessment Files Research Office, Ontario Geological Survey, Toronto).

In 1953, diamond drilling on Bonnie Gold Mines Limited (Wagman Group) [1952] (4), 1 to 1.5 m thick bands of pyrite, and pyrrhotite with trace amounts of chalcopyrite and sphalerite in metavolcanics and metasediments were intersected in numerous sections at variable depth (Assessment Files Research Office, Ontario Geological Survey, Toronto).

The 1972 diamond drilling by Amax Exploration, Incorporated intersected 10 to 15 percent pyrrhotite mineralization over a core length of 7 m (36 m and 43 m) in an intermediate tuff. The sulphides consist of pyrrhotite and traces of chalcopyrite (Assessment Files Research Office, Ontario Geological Survey, Toronto).

CLAY, SAND, AND GRAVEL DEPOSITS

Sand and Gravel

Numerous sand and gravel pits along the Tashota Mine Road, Castlewood Lake Road, Con Lake Road, and Auden Road have been used in the building of these roads. Deposits of fine lacustrine (?) clayey sand are particularly extensive at the southern and eastern boundaries of the map-area.

Clay Deposits

An extensive deposit of lacustrine (?) varved clay is found throughout the northern part of the map-area south of Conglomerate Lake, and along the Onaman River. This deposit, roughly followed by the Tashota Mine Road, is partly oxidized into brownish yellow bands west of Conglomerate Lake. The clay covers most of the top one quarter of the map-area making it extremely difficult to correlate the rock units in this part of the map-area.

Description of Properties

All the recorded exploration work conducted on the properties and showings, which is recorded in the files of the Regional Geologist's Office, Ontario Ministry of Natural Resources, Thunder Bay, and in the Assessment Files Research Office, Ontario Geological Survey, Toronto is summarized alphabetically in Table 13.

As used in this report a "property" is a claim group or parcel of land held on December 31, 1976. The properties are listed alphabetically by the name of the owner. Name(s) of previous owner(s) appear in parentheses after the name of owner.

In this report the following definitions are use:

A *deposit* is a mineral deposit open for staking on Crown Lands and the term is used to include a mine, prospect, and occurrence;

A *mine* is a past producer regardless of value of production;

A *prospect* is a deposit on which significant exploration and/or development work has been done;

An *occurrence* is a deposit on which less than 600 m of drilling and no lateral development work has been done.

Unclaimed land with no mineral deposit, but upon which exploration work has been done, is listed by the full name of the last company or persons who conducted major work, and the date in parentheses after the title is the date of the last major work done.

The numbers in parentheses following each property description heading refer to property location numbers on Map 2429 (back pocket), and to those described in the text.

AMAX EXPLORATION, INCORPORATED [1972] (1)

In 1972, Amax Exploration, Incorporated acquired seven claim groups following an airborne magnetic and electromagnetic survey that was conducted over a large area that included the map-area, and that extended from the area north of Jellicoe presumably to the Onaman River (J.E. Steers 1973, Assessment Files Research Office, Ontario Geological Survey, Toronto). One of these claim groups, known as the Castlewood Group, consisted of eight contiguous unsurveyed claims numbered TB 335054 to TB335058, and TB 329596 to TB 329598 inclusive, and comprises a total of approximately 129 ha. Several survey grid lines representing previous surveys were recognized during the field season, but according to H. Petak (1972, Assessment Files Research Office, Ontario Geological Survey, Toronto) "the property was covered by two different (previous to 1972) grids" an older north-south and a northeast-trending grid. Petak also reported an old diamond-drill hole drilled to the southwest of an Amax Exploration, Incorporated diamond-drill hole that was not located by the field crew.

The "Castlewood Group" of claims belonging to Amax Exploration, Incorporated, located just northeast of Castlewood Lake, was investigated by an exploration programme which consisted of line cutting, electromagnetic and magnetic surveys, geological mapping, and soil sampling. Following the line cutting, ground Radem VLF and magnetometer surveys were conducted. A geological mapping survey of the property and a geochemical soil survey were conducted to assist in checking out the ground EM conductors located by the Radem VLF survey. The Radem survey was not definitive, therefore, a JEM (junior electromagnetic) survey was then carried out which indicated only one anomaly in the south-central part of the property (Claim TB 335057). This anomaly was supported by a direct magnetic correlation and was tested by one diamond-drill hole 77.8 m deep which intersected a 7.0 m wide zone of 10 to 15 percent sulphide mineralization in an intermediate tuff at a length between 36 and 43 m. The sulphides consist of pyrrhotite and scattered traces of chalcopyrite. Several thin 25 to 50 mm lenses of 40 to 90 percent sulphides (pyrrhotite and pyrite) were observed in the sulphide zone and in other sections of the core. Copper, lead, zinc, and silver values in the soil survey were uniformly at the background level, and since the conductive zone was adequately explained and no economically significant mineralization was realized, no further work was recommended. The property has reverted back to the crown.

In the geological survey (Figure 4), at least two-thirds of the property was interpreted to be underlain by volcanic rocks; outcrop scarcity (only 5 to 10 percent) made the interpretation of the rest of the property difficult. The volcanic rocks were considered to be a series of massive flows to coarse fragmental tuffs of mafic to intermediate composition (units 1a,h,j,k; 1b,c,k; and 1mw on Map 2429, back pocket) with narrow, not thicker than 18 m felsic metavolcanic units.

AMOCO CANADA PETROLEUM COMPANY LIMITED (OUELLET OPTION) (2)

Fourteen unpatented mining claims numbered TB 446433-34, TB 446437 to TB446440, and TB 446452 to TB446459 inclusive fall on the north-central

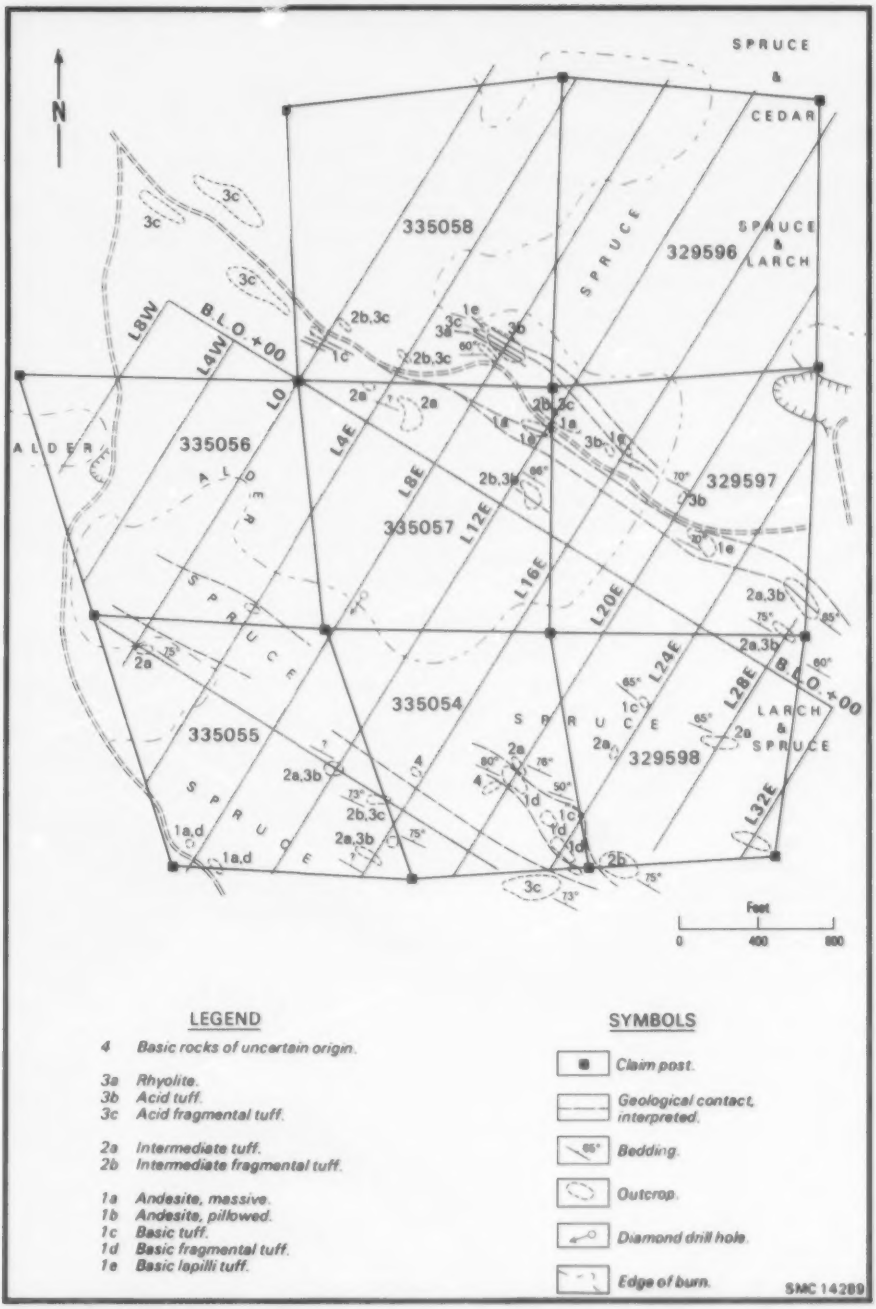


Figure 4–General geology of Amax Exploration, Incorporated Occurrence (from Assessment Files Research Office).

boundary of the map-area and form part of a group that was staked by S. Ouellet, but was transferred to Amoco Canada Petroleum Company Limited who currently hold title to the ground. No exploration survey record for the ground is available, but during the field season, geophysical (electromagnetic and magnetic) and geological surveys were being conducted on a line grid system that covered all or most of the property. Results of the surveys are unavailable. However, oral discussions were held during the field season with the geological field crew employed by Amoco Canada Petroleum Company Limited. They concurred with the author and his assistants' interpretation that the property is underlain predominantly by pillowed mafic flows and interflow tuffs that have been intruded by a gabbroic body. At the southeastern corner of the property, an extension of a metaconglomerate unit might occur (see also Map 2429, back pocket).

BRIAN C. ASBURY (3)

In the northwest corner of the map-area, occurs part of a larger claim group currently registered to Brian C. Asbury (3) which is located astride the North Onaman River. In the map-area, the 18 southernmost unpatented mining claims are numbered TB 477907 to TB477924 inclusive.

Although no work record of exploration is available, the author knows that Geophysical Engineering Limited has been active in this general area for several field seasons, and that this company might hold an option on this ground.

The property is underlain by part of a gabbroic-dioritic intrusion that has invaded mafic flows and tuffs. The southwestern section of the ground is cut by a prominent diabase dike.

BONNIE GOLD MINES LIMITED (WAGMAN GROUP) [1952] (4)

In 1952, probably because of activity on the Kenty Prospect, Bonnie Gold Mines Limited owned a property known as the Wagman Group that consisted of nine unsurveyed mining claims numbered TB 44400 to TB 44408 inclusive. The centre of the northern border of the 145 ha claim group is located on the "Mine Road", 1.6 km east of the western boundary of the map-area, just to the north of the Castlewood Lake Road. Between May and June 1952, a magnetometer survey was completed. The magnetic survey outlined a number of irregular east-trending anomalies in the central part of the property, and a narrow continuous northeast-trending anomaly defined in the southeastern corner of the ground was interpreted (see Map 2429, back pocket) to represent a diabase dike. Owing to the extensive overburden covering most of the property, two diamond drill holes were recommended to test the central anomalous zone of the magnetic survey.

A total of 607.8 m of diamond drilling was accomplished in drill hole number one (Claim TB 44404, depth of 310.1 m) and drill hole number two (Claim TB 44402, depth of 296.9 m) in March, 1953. The diamond-drill holes intersected

variable widths of 5 to 10 percent sulphide mineralization (pyrite and pyrrhotite) at several depths, the intersections ranged from 0.16 m to 6.1 m in length. A few narrow (less than 30 m) massive (100 percent) lenses of pyrrhotite (diamond-drill hole No. 1 from 74.2 to 74.3 m) were intersected. Trace amounts of chalcopyrite and sphalerite were also detected in the diamond drilling which intersected metasediments and metavolcanics.

The only observed rock outcrops in this area are composed of metaconglomerate, and these are exposed on the banks of the Onaman River. In the area just to the south, several outcrops of a nearly north-trending diabase dike were mapped (Map 2429, back pocket). The claims were allowed to lapse.

PAUL CARIGNAN (5)

A group of 14 contiguous, unsurveyed mining claims are registered in the name of Paul Carignan in the area west of Grasser Lake, District of Thunder Bay. Two of these claims numbered TB 303492 and TB 303493 and forming the northwestern boundary are located in the map-area, about 3 km due south of Con Lake. The property covers the western edge of the Hudson Bay Exploration and Development Company Limited Occurrence which is mainly outside the map-area.

Between the summers of 1971 and 1972, an exploration programme was carried out over four claim groups in the Onaman River area of the Geraldton-Beardmore area. One of these groups, Group "N", consisted of 14 contiguous, unsurveyed claims all of which are now registered in Paul Carignan's name. Only two of these claims are partly located in the map-area. Two reports were submitted by Hudson Bay Exploration and Development Company Limited. The first report (File 2-810, Assessment Files Research Office, Ontario Geological Survey, Toronto) was concerned with the results of a ground electromagnetic survey and diamond drilling that was conducted over Grid "N" during 1971. The second report (File 63-3054, Assessment Files Research Office, Ontario Geological Survey, Toronto) was a final report on all groups (excluding group 5) that was submitted for the Mineral Exploration Assistance Programme (Contract Number GB-24, dated July 5, 1972) and included most of the diamond drilling of an exploration programme conducted on groups M, N, and X in 1972. All are located in the Grasser Lake area and extend into the map-area. Because most of the significant work reported was in the "N" group that extends into the map-area, only those surveys conducted in this group are discussed.

An electromagnetic survey was conducted between July 2 to September 3, 1971, over group "N" before the Mineral Exploration Assistance Programme was rendered on July 5, 1972. Diamond drilling consisting of four holes (N-1 to N-4) totalling 621.1 m was carried out to test conductor zones outlined by the electromagnetic survey. The results of these surveys were used as guidelines in the subsequent surveys.

In the subsequent electromagnetic survey conducted in June 1972, several strong conductive zones were outlined, and four additional recommended diamond drill holes numbered N-5 to N-8 totalling 710.5 m were collared. The drill holes all intersected bands of iron formation (magnetite), graphite schist, and pyrrhotite-pyrite-marcasite mineralization ranging from 1 to 5 percent, 10 to 2

TABLE 18 | SUMMARY OF DIAMOND-DRILL HOLE INTERSECTIONS CONDUCTED BY HUDSON BAY MINING AND DEVELOPMENT COMPANY LIMITED, FROM FILE 63-3054, ASSESSMENT FILES RESEARCH OFFICE, ONTARIO GEOLOGICAL SURVEY, TORONTO.

Hole No.	Depth (in feet)[1]	Conductor Intersection (from top to bottom)	Host Rock (from top to bottom)
N-1	300	Bands of pyrite-pyrrhotite, trace sphalerite	Mylonite, fragmental dacite/andesite, sheared dacite
N-2	795	Bands of pyrrhotite-pyrite, magnetite, graphite schist, trace chalcopyrite	Pyroclastic (?) dacite, fragmental dacite/andesite, fault breccia, graphite schist
N-3	498	Pyrrhotite-pyrite, trace chalcopyrite, marcasite, graphite schist, magnetite	Siliceous shear zones, graphite schist, banded magnetite (IF).
N-4	450	Graphite schist, pyrrhotite-pyrite, magnetite, trace chalcopyrite	Graphite schist, sheared dacite, banded magnetite, rhyolite band/coarse andesite
N-5	604	Magnetite, graphite schist pyrrhotite-pyrite-trace chalcopyrite	Iron formation, graphite schist, dacite
N-6	690	Pyrite-pyrrhotite-minor chalcopyrite, magnetite	Dacitic tuff, Iron Formation chlorite schist, andesitic tuff, sericitized dacite-rhyodacite, quartz-carbonate zone
N-7	337	Bands of pyrrhotite-pyrite, minor chalcopyrite and sphalerite	Siliceous "shear zone", porphyritic rhyolite
N-8	700	Bands of pyrrhotite-pyrite-trace chalcopyrite, graphite schist, magnetite	Siliceous "shear zone", graphite schist, Iron Formation, andesite, rhyolite breccia

[1]To obtain metres multiply feet by 0.3048.

percent and up to massive (100 percent) in parts and trace amounts of chalcopyrite and sphalerite (Table 18).

The sulphide mineralization was contained in mylonite, pyroclastic dacite and andesite, fault breccia, graphite schist, and in siliceous shear zones (the most common host). A summary of the sulphide and conductive zones intersected in the diamond drilling programme is given in Table 18.

Bands of iron formation (magnetite), graphite schist, pyrite-pyrrhotite, and trace chalcopyrite are also recorded in the 1972 diamond drilling of Hudson Bay Exploration and Development Company Limited in the Grasser Lake area (Assessment Files Research Office, Ontaio Geological Survey, Toronto). Fifteen to twenty percent pyrrhotite, and one percent pyrite occur in massive and dissemi-

nated bands between lengths of 42.1 and 47.5 m in dacite. A banded magnetite zone consisting of 12.5 mm thick bands was cut between lengths of 48.6 and 51.6 m. Other typical zones intersected in the drilling of one hole for example included: 15 percent or more pyrrhotite and pyrite between 77.8 to 80.2 m in a fault breccia; 80.2 to 93.0 m in a metaandesite; 98.8 to 107.6 m in a metaandesite, 129.9 to 135.3 m in a fault breccia; 692.0-697.0 feet in a metaandesite, pyrite and pyrrhotite-bearing graphite schist zones between 60.5 to 68.1 m, 135.5 to 137.7 m, 149.9 and 158.1 m; and banded magnetite seams at 93.0 and 98.8 m. All the above information was obtained from File 63.3054 Assessment Files Research Office, Ontario Geological Survey, Toronto.

It is not known whether Paul Carignan optioned his property to the Hudson Bay Exploration and Development Company Limited in 1971-1973, or whether he staked the ground after it was allowed to lapse by the Hudson Bay Exploration and Development Company Limited.

As indicated on Map 2429 (back pocket) the two claims of the property in the map-area fall in an area of extremely deformed mafic pillowed flows and associated tuffs. The narrow band of metasediments that were reported to go through this area (Moorhouse 1938) have been re-interpreted as associated interflow tuff bands in this report.

ROLLAND COLLINS (6)

Three separate groups of 27 unpatented and unsurveyed mining claims are registered to Rolland Collins in the northeast of the map-area. These groups are hereby referred to as: 1) the northern group; 2) the central group, and 3) the southern group.

The Northern Group (Geophysical Engineering Occurrence)

The group consists of six contiguous claims numbered TB 431511 to TB 431514 inclusive, and TB 431517 to TB 431518 also inclusive. This group covers the Geophysical Engineering Occurrence which was tested by 32 m of diamond drilling from one hole (K-2, TB 431511) in August 1975. In this drilling, 6.63 m of disseminated to massive (30 percent total volume) seams of pyrrhotite with some pyrite (with trace copper, lead, zinc and silver) were intersected in a graphitic shale between 14.9 and 21.6 m (Assessment Files Research Office, Ontario Geological Survey, Toronto).

The Central Group (Geophysical Engineering Occurrence and Palomino Exploration Occurrence)

This group is made up of nine contiguous claims numbered TB 431532 to TB 431535 and TB 432066 to TB 432070 inclusive. This group covers the Palomino

Explorations and Geophysical Engineering Occurrences. The Geophysical Engineering Occurrence was investigated by drilling one hole (K-1) 34.7 m long located on claim TB 432068 and was done in August 1975. Bands of pyrite with some pyrrhotite (and trace base and precious metals) were intersected between 17.4 to 17.7 m (30 percent) and 31.9 to 33.4 m (massive) in intermediate to mafic metavolcanics. In 1967, Palomino Explorations Limited conducted ground electromagnetometer and magnetometer surveys as a follow-up survey of an airborne magnetic-electromagnetic survey (G.L. Kirwan 1967, Assessment Files Research Office, Ontario Geological Survey, Toronto). The work was conducted on a 20 claim group (approximately 323 ha) numbered TB 133086 to TB 133105 inclusive. This survey covered two of Rolland Collin's claims numbered TB 432067 and TB 432070. Two major anomalous zones not in this property were outlined in the same survey on J. Thomas Neelands (17) and Lynx-Canada-Dejour-Canadian Reynolds Syndicate (15) properties and were tested by two diamond drill holes totalling 306.1 m.

During 1967, diamond drilling was undertaken by Palomino Explorations Limited (G.L. Kirwan 1968, Assessment Files Research Office, Ontario Geological Survey, Toronto). A 1.3 m long section of massive pyrite-pyrrhotite was intersected from a depth of 61.1 to 68.4 m in a diamond-drill hole located approximately 365 m east of the culvert bridge on the Mine Road which crosses the creek near, but outside the northern border of the map-area. G.L. Kirwan (unpublished report, Assessment Files Research Office, Ontario Geological Survey, Toronto) stated:

> Samples of this core each about five feet [1.5 m] in length returned an average of 36.4 percent sulphur and 41.6 percent soluble iron. Host for this massive sulphide mineralization is Temiskaming (?) metasediments, essentially greywacke.

Diamond drilling by Noranda Mines Limited has also indicated a thickness of massive sulphide iron formation, in the area just north of the map-area. This probably corresponds to a Palomino geophysical conductor up to 24 m wide which contains, in order of abundance, pyrite, pyrrhotite, and traces of sphalerite, and chalcopyrite, and which was interbanded with felsic metavolcanics (Thurston 1976, p.53). Thurston also reported that this unit is interbanded with the felsic metavolcanics east of MacDonald Lake [out of the map-area].

The Southern Group (Rouandah Gold and Metals Limited (1952))

The southern group is made up of 12 contiguous claims numbered TB 431520-TB 431531 inclusive which cover most of the ground that was investigated by Rouandah Gold and Metals Limited in 1952, as the "Lee Group No. 3" (N.B. Keevil, Report 63-285, Assessment Files Research Office, Ontario Geological Survey, Toronto). A geophysical survey (magnetometer) was carried out in May, 1952, and although a number of anomalies were located by the survey, they were explained to be the result of a wide porphyry dike and only stripping and shallow trenching were recommended to test the "anomalies".

The northern and central groups appear to be located astride the metavolcanic-metasedimentary contact (Map 2429, back pocket). The geology of the

southern group is interesting because the group covers the area north of the "Con Creek Showing" where mafic flows and associated interflow tuffs are cut by north-trending sheared, sericitized, and sometimes carbonatized quartz- and/or feldspar porphyry dikes which carry copper-lead-zinc-silver mineralization. The northeasternmost claim (TB 431528) lies at a mafic metavolcanic-granitic contact, the granitic outcrops being part of a larger granitic stock.

CONIAGAS MINES LIMITED [1952] (7)

In 1952, Coniagas Mines Limited owned a group that comprised 27 unpatented mining claims, numbered TB 42764 to TB 42790 inclusive, which was known as the "South Onaman River Claims". This group is situated astride the western boundary, just south of the Onaman River and is traversed by the Mine Road and the Castlewood Lake Road. A geophysical survey grid consisting of 37 km of chained wing lines were cut across a 1836 m east-trending baseline. The wing lines were cut at 120 m intervals and were picketed at 30 m intervals. A magnetometer survey conducted on the grid indicated only one broad anomalous area 300 to 600 m wide and extending across the property (north of the baseline). The anomalies within the zone were not extreme, ranging from 400 to 600 gammas south of the baseline and up to 5,000 gammas north of it, and in most cases lacked continuity. The anomalies were interpreted to represent; a) magnetic susceptibility changes between differing interbedded lithological units, the so called "formational" character, b) a shear zone north of the baseline, and c) a northwest-trending dike. Only the shear zone located north of the base line was recommended to be tested by two X-ray type drill holes (V.H. Minns, 1952, File 63.341 Assessment Files Research Office, Ontario Geological Survey, Toronto), because the anomalies were in general considered to reflect changes in rock types rather than sulphide mineralization, and surface prospecting failed to locate any commercial material. This recommendation was apparently not carried out, and it is not known when the ground reverted to the crown.

The Coniagas Mines Limited group of claims was tied on the east border to the "Wagman Group" of claims that contain the Bonnie Gold Mines Limited (Wagman Group) [1952] (4) Property in which up to 20 percent of pyrrhotite-pyrite (trace chalcopyrite) mineralization was intersected. Since the formations of the metavolcanics and metasediments here strike east, an extension in the mineralization of the above occurrence can be expected in both directions. These two claim groups, however, occur at a metasedimentary-metavolcanic contact as in the Rolland Collins (6) Property. Massive and wide intersections of sulphides can also be expected from both of these (Onaman River and Wagman) groups. Only sparse outcrop exposure exists in both groups, therefore geophysical and/or diamond drilling surveys would be required to test the area.

CONWEST EXPLORATION COMPANY LIMITED (8)

Conwest Exploration Company Limited owns a group of 28 contiguous unsurveyed mining claims in the Kaby Lake area of Thunder Bay Mining District,

believed to be optioned from prospector F. Minnoletti of Thunder Bay. Only three of these claims (TB 386097, TB 386105, and TB 386106) occur in the map-area about 0.8 km south of Pinel Lake. Although there is no record of exploration work conducted, it is known that in 1974-1975 after the area was mapped in 1972 by Mackasey and Wallace (1974), Conwest Exploration Company Limited obtained a working option on these claims and that several trenches exposing gold mineralization in a granitic stock, which is reported to be in Elmhirst Township by Mackasey and Wallace (1974), and have been observed by K.G. Fenwick, Regional Geologist, Ontario Ministry of Natural Resources, Thunder Bay.

The three claims in the map-area are in massive and/or porphyritic intermediate metavolcanics, but the geology and mineralization was described in detail as the S. Dodds find by Moorhouse (1938, p.19):

S. Dodds

The S. Dodds find is located eight chains south of the north boundary of Elmhirst township, some 28 chains [563.3 m] west of mile II [3 km], on a group of six claims, TB 24,914 to TB 24,919 inclusive.

Some gold values were obtained by S. Dodds, working for P.E. Hopkins, from a silicified shear zone in diorite. The shear zone strikes N.50°W. It has been stripped for 90 feet [27.4] and ranges in width from 1 inch [2.5 cm] to 3 feet[0.9 m].

The chief sulphide present is pyrite. A little copper stain and magnetite were also noted. Silver sulphides are reported. The quartz is not abundant, but is well fractured, with inclusions of chloritic material, in whose vicinity it tends to be dark-bluish in colour. Other minerals include yellow and white carbonate and pink feldspar, the last-mentioned occurring as a 3-inch [75 mm] dikelet at the north end of the shear zone. Work was also done on a 16-foot [4.9 m] mass of quartz, which failed to give good values.

NOLAN COX (9)

Four claims numbered TB 383544 to TB 383547 inclusive are registered in the name of Nolan Cox of Beardmore, in the area located 3.4 km northwest of Con Lake; that is 1.5 km southwest of Mile 57 (91.2 km) on the Nipigon Forest Reserve line. This ground completely involves the "Con Creek Showing", a lead-zinc-copper-silver deposit which was originally called the Wells and Johnson's gold find (Gledhill 1925, p.81).

History

According to Gledhill (1925, p.70):

Claim staking was at its height in the summer of 1923 and in the spring of 1924, and continued [summer of 1924], as the gold belt was extended westward along the south branch [of the Onaman River].

Gledhill (1925, p.72) further stated that:

Wells found mineralized quartz in greenstones on TB 4480, a mile [1.5 km] southwest of mileage 57 [91.2 km] on the Reserve line,...

Gledhill (1925, p.81) also stated that:

> Gold values were obtained from (these) quartz veins on this claim lying in much disturbed greenstone schist about fifteen chains [300 m] west of the main granite greenstone contact ... The ore minerals noticed were sphalerite, pyrite, chalcopyrite, and arsenopyrite [galena?]. Cobalt bloom was found in a diabase dike near these veins.

During 1929-1930, Kindle (1931) reported that two trenches were found, one north of the other, and narrow quartz veins carrying pyrite, chalcopyrite, sphalerite, and galena were also reported. Another parallel but poorly mineralized vein 2 m wide and located 182 m west of the main zone was also reported by Kindle but was not located by the author and his assistants.

According to channel sampling by K. Springer in June 1930 (D.P. Robertson, 1960, File 63.1042 Assessment Files Research Office, Ontario Geological Survey, Toronto) low values in gold were reported.

Although the showing was not described in the report of Moorhouse (1938), it is shown on Map 47H, which accompanies his report.

The ground was also visited by G.W. Fancy, probably at the request of, or as an employee of New Bidlamaque Gold Mines Limited on August 24, 1959, and on September 1, 1959. He is reported to have issued a report of his visit (D.P. Robertson 1960, File 63.1042, Assessment Files Research Office, Ontario Geological Survey, Toronto, Figures 5 and 6) which is not available to the author.

In 1959, the showing was covered by a 42 claim group of contiguous unpatented and unsurveyed mining claims numbered TB 97247 to TB 97249 inclusive, TB 97242 to TB 97244 inclusive, and TB 94936 to TB 94971 inclusive, belonging to New Bidlamaque Gold Mines Limited. In a report by D.P. Robertson (1960, File 63.1042, Assessment Files Research Office, Ontario Geological Survey, Toronto) Sulmac Exploration Services Limited, who were probably hired on contract to conduct the exploration surveys, completed a geophysical survey consisting of electromagnetometer, and magnetometer surveys late in 1959. In this survey, three conductive zones numbered "A", "B", and "C", and four conductors were outlined (Figure 5). Conductor 1 exhibited a strong linear conductive feature trending north in the middle of the claim group, and was on strike with a fourth conductor "3" which was weaker, but was located in an area of surface mineralization. Zone "A" was tested by two diamond-drill holes, and zones "B" and "C" by two holes each. In the subsequent diamond drilling programme, six holes totalling 915 m in length were completed in March 1960 (Figure 7). Sulphides consist principally of pyrite and pyrrhotite, with very minor amounts of chalcopyrite and sphalerite in core sections ranging from 3 to 50 m or from less than 3 to 502.9 m (hole 2), according to Robertson (1960, File 63.1042, Assessment Files Research Office, Ontario Geological Survey, Toronto). Robertson also reported that the sulphides range in content from minor (less than 10 percent) to massive (100 percent) amounts of mainly pyrite, and that, "associated with the sulphides in places, are bands of lean iron formation not exceeding four feet [1.2 m] in core length. Samples for assay were selected after logging and were run for gold, silver, copper, zinc, nickel, and cobalt without significant results".

A summary of the diamond drilling is given in Table 19.

In 1971, the ground was apparently acquired by Dave Thorsteinson who at that time owned a block of 21 contiguous, unpatented, and unsurveyed mining

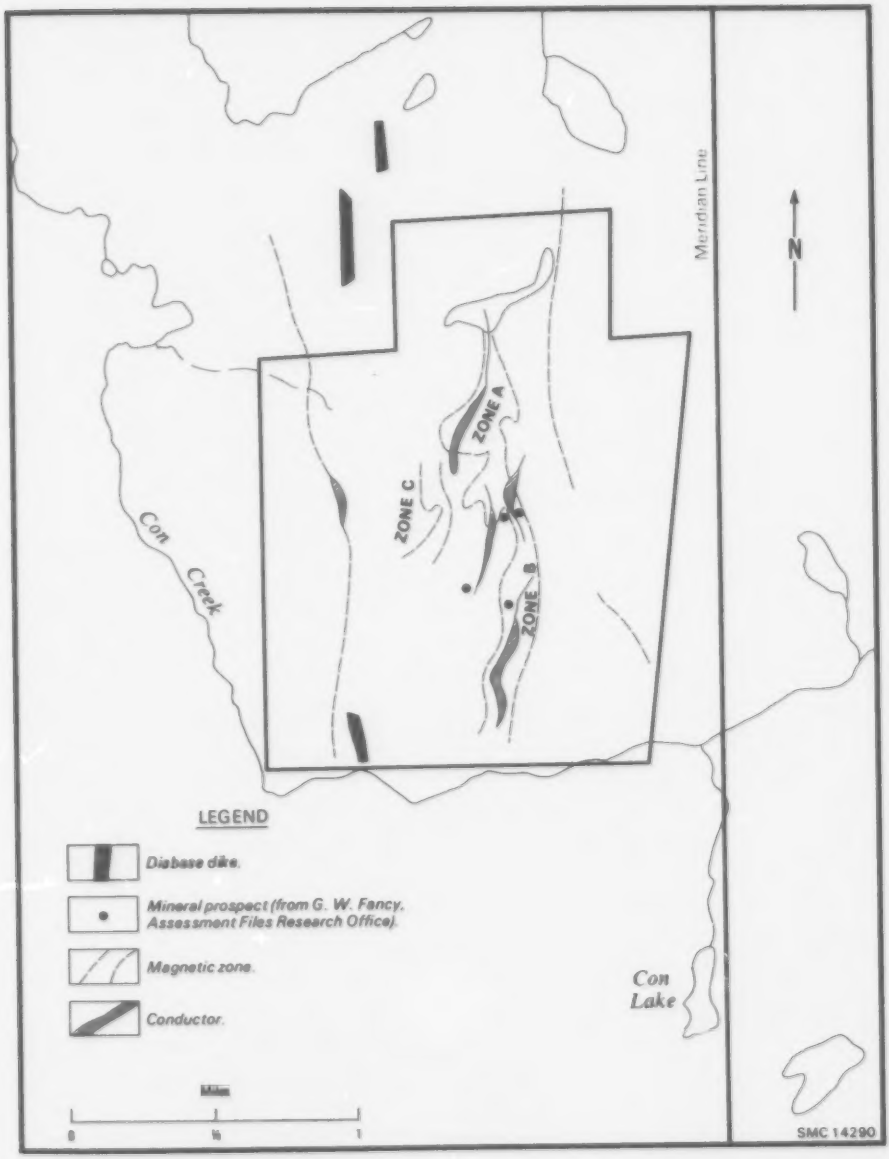


Figure 5–Geological and Geophysical Summary sketch-map of "Con Creek Showing" area, by New Bidlamaque Gold Mines Limited.

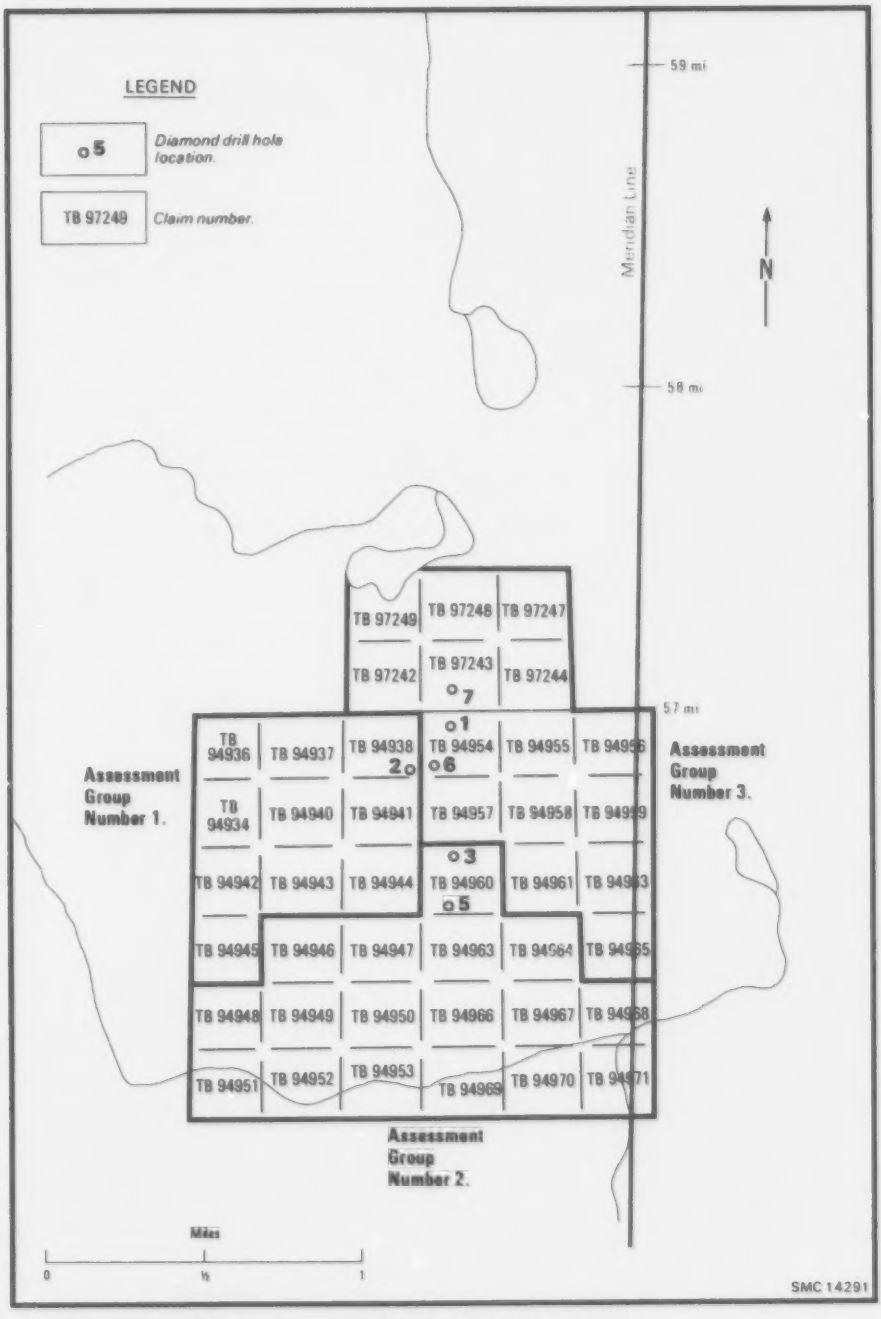


Figure 6–Property sketch-map of New Bidlamaque Gold Mines Limited.

TABLE 19 | SUMMARY OF THE 1960 NEW BIDLEMAQUE MINES LIMITED DIAMOND DRILLING ON NOLAN COX (9) PROPERTY (FROM D. P. ROBERTSON, 1960, ASSESSMENT FILES RESEARCH OFFICE, ONTARIO GEOLOGICAL SURVEY, TORONTO).

Claim Number	Hole Number	Depth (feet)[1]	Azimuth/Inclination	Conductor/Host Rocks
TB 94954	1	351	E/-45°	Pyrite-pyrrhotite (3:2 ratio) ± chalcopyrite (up to 0.18/in 5 feet) in a chlorite schist (1q)
TB 94938	2	401	S45°E/-45°	5-100 percent pyrite and pyrrhotite, minor chalcopyrite in a silicified andesite schist (1u)
TB 94960	3	351	E/-45°	15% pyrite and minor sphalerite (0.36% from 169.2-177.1 feet) in carbonatized andesite and chlorite schists (1qu)
TB 94960	5	351	E/-45°	10% pyrite-pyrrhotite between 68.3-69.6 feet in quartz-carbonate veins in andesite and chlorite schists (1qu)
TB 94954	6	337	E/-45°	2-100% pyrite-pyrrhotite (trace chalcopyrite-sphalerite) between 176.7-265.5 feet, minor iron formation with sulphide in carbonatized andesite and chlorite schist (1qu)
TB 97243	7	288	E/-45°	Narrow bands of iron formation (5-10% magnetite) in massive to foliate, foliate to schistose andesite with chlorite schist bands (1qtu)

Note: For map codes see Map 2429, back pocket.
Holes 1 and 7 bottomed in a granitic rock, and the quartz and/or feldspar porphyry dikes observed in the trenches were not intersected in the drilling.

[1]To obtain metres multiply feet by 0.3048.

claims (16 ha) numbered TB 349361 to TB 349362, TB 349929 to TB 349945, and TB 335171 and TB 349571 inclusive. This property was apparently acquired by Lynx-Canada Explorations Limited on option in 1971, who conducted some geological mapping, soil sampling, and magnetometer survey on part of the claim group (A.D. Pudifin, 1974, File 2.1475, Assessment Files Research Office, Ontario Geological Survey, Toronto). Lynx-Canada Exploration Limited apparently cancelled the option on the ground, and the ground apparently resorted to Dave Thorsteinson. Shawmin Explorations Limited then acquired the group of claims under option from Dave Thorsteinson in 1973 and hired Pudifin and Company to conduct an electromagnetic survey. In a report by A.D. Pudifin (1974, File 2.1475, Assessment Files Research Office, Ontario Geological Survey, Toronto), one main sinuous north-striking conductive zone 365 m long was outlined by the survey, and several other medium to weak, one-line anomalous zones were reported. The conductive zones were not coincident with the main surface showing probably because of the predominant sphalerite-galena mineralization, and the minor amount of pyrite-pyrrhotite. The surface mineralization was then reported by Pudifin (1974, File 2.1475, Assessment Files Research Office, Ontario Geological Survey, Toronto) thus:

> Chalcopyrite, pyrite, sphalerite, and some galena occurs in a north-south striking silicified fracture-shear zone at 7°25'E line 0+00, extending to the north where it is observed at 3+00N. Barren quartz is also present. Small amounts of pyrite and sphalerite with minor pyrrhotite are found at several other locations on the property.

In the subsequent diamond drilling programme, four diamond-drill holes totalling 158.1 m were collared on the two trenches (Map 2429, back pocket) between March-April, 1973. Results are summarized in Table 20.

General Geology

Several trenches and outcrops in the Con Creek Showing are now exposed along the Con Lake road system where sheared and pillowed mafic flows are cut by highly sheared, sericitized, and sometimes carbonatized, north-trending quartz and/or feldspar porphyry dikes. The association and possible relationship between the mineralization and these dikes is readily apparent in the northeast part of the map-area and is discussed elsewhere in this section. Outcrops on the western border of the granitic body reported by Thurston (1976) are also exposed along the roads in the northeast part of the property.

Mineral Deposits

The showing consists of a narrow zone cut by thin quartz veins containing narrow mineralized widths (2 to 15 cm) consisting of sphalerite, galena, chalcopyrite and silver mineralization. Assays of grab samples by the Geoscience Laboratories, Ontario Geological Survey, Toronto, of the best mineralized material taken from several trenches in the property yielded these values: copper 0.06 to

TABLE 20 | SUMMARY OF THE 1973 SHAWMIN EXPLORATION LIMITED DIAMOND DRILLING ON NOLAN COX PROPERTY (FROM A. D. PUDIFIN, 1974, ASSESSMENT FILES RESEARCH OFFICE, ONTARIO GEOLOGICAL SURVEY, TORONTO).

Claim Number	Hole Number	Depth (feet)[1]	Azimuth/Inclination	Conductor/Host Rocks
TB 335171 On the trench southeast of the "fork" on the road	CC-1	138.0	E/-45°	Galena-pyrrhotite, minor chalcopyrite between 110-113 feet and 115-120 feet in carbonatized, massive and altered (sheared) meta-andesite
TB 349571 On the trench northeast of the "fork" on the road	CC-2	129.0	E/-45°	Streaks and blebs of pyrrhotite, some sphalerite and chalcopyrite between 121.5-122.5 feet in altered andesite
TB 349571 On the trench northeast of the "fork" on the road	CC-3	108.0	W/-45°	Streaks and stringers of 'bronzy' pyrrhotite with sphalerite (77.4-78 feet) in quartz-carbonate veins; Heavy (up to 50 percent?) chalcopyrite between 84-86 in meta-andesite
TB 335171 On the trench southeast of the "fork" on the road	CC-4	145.0	W/-45°	Streaks and disseminations of 'bronzy?' pyrrhotite in altered (quartz-carbonate) and brecciated meta-andesite

Note: For approximate location see Map 2429 back pocket.

[1]To obtain metres multiply feet by 0.3048.

1.02 percent, lead 0.39 to 11.4 percent, zinc 0.25 to 19.2 percent, 1.78 to 16.42 ounces of silver per ton, and 0.01 to 0.08 ounce of gold per ton, see also Table 17, sample numbers 1-15 for details of the results.

PHIL DZUBA (10)

Phil Dzuba of Thunder Bay is the registered owner of nine unpatented, contiguous mining claims numbered TB 432543 to TB 432551 inclusive, and are located around the culvert bridge over Con Creek on the Mine Road, astride the Mine Road-Con Lake Road intersection, about 2.5 km southwest from the map-area boundary.

There is no record of work on this property, but the ground is adjacent to the west border of the property of Rolland Collins (6), where the Palomino Explorations and Geophysical Engineering Occurrences are located.

The property is underlain by a polymictic, clast-supported, pebble to cobble metaconglomerate which is exposed on the river at the bridge, and the area just southwest on the east and west sides of the Mine Road.

DAVID R. GALLEY (11)

Six mining claims numbered TB 386130 to TB 386131, and TB 433734 to TB 433737 inclusive are registered to David. R. Galley of Thunder Bay, and the claims are located just south of Con Lake. Four of these claims are in the map-area.

There is no record of exploration, but this property is adjacent to the northwest border of the property of Paul Carignan (5) where the Hudson Bay Exploration and Development Occurrence was outlined in 1972.

The ground is underlain by highly deformed and altered pillowed mafic flows and associated interflow tuffs near a major granitic intrusion which outcrops outside the map-area.

JACOBUS COPPER NICKEL PROSPECT (CHESTERVILLE MINES PROSPECT) (12)

The prospect proper is made up of 18 leased and surveyed claims and is located just outside the map-area, south of the northern boundary of Elmhirst Township between Mileages 4 and 5 (6.4 and 8 km). The history and geology of this prospect is described in detail by Mackasey and Wallace (1978). In essence, the exploration programme conducted by Jacobus Mining Corporation Limited outlined between 1957 and 1972 an estimated 937 538 tons of 0.42 percent copper and 0.41 percent nickel (Mackasey and Wallace 1978, p.117).

The northern limit of three of these surveys (Files 63.947, 63.2676 and 2.743, Assessment Files Research Office, Ontario Geological Survey, Toronto) extended

into the southern border of the map-area between Mileages 4 and 6 (6.4 and 8 km) on the northern border of Elmhirst Township. The surveys are reported in detail by Mackasey and Wallace (1978), but included general and detailed geological mapping, a geochemical survey, an induced polarization survey, electromagnetometer and magnetometer surveys, and a total of 8916.9 m of diamond drilling in 57 diamond-drill holes.

Before June 1976, Harold Watts owned ground north of the township boundary between Mileages 2.5 and 3.8 [4 and 6 km], (see Map 2429, back pocket). This area was described in Report 63.947 (Assessment Files Research Office, Ontario Geological Survey, Toronto). The property was cancelled by June 17, 1976, and the ground has since resorted to the Crown.

The area northeast of Mileage 5 (8 km) on the northern boundary of Elmhirst Township is underlain by diorite, unsubdivided mafic metavolcanics, and porphyritic felsic pyroclastic rocks. In the area near mileage 3 (4.8 km), (former Harold Watts ground) an intrusive contact between porphyritic felsic pyroclastic rocks and a porphyritic quartz-bearing diorite is also present and shown on Map 2429, back pocket.

AMEDE LAFONTAINE (13)

Amede Lafontaine of Beardmore is the registered owner of a group of 24 unsurveyed contiguous mining claims which is traversed by Con Creek on the northeast and southeast parts. The claims are numbered TB 434633 to TB 434644 and TB 386214 to TB 386222 inclusive.

In 1952, the top half of this property was included in the 12 claim group of Coniagas Mines Limited, on which an electromagnetometer survey was conducted by McPhar Geophysics Limited. No good conducting zones were recorded and no further work was recommended (S.H. Ward 1952, File 63.295, Assessment Files Research Office, Ontario Geological Survey, Toronto). The property ties onto, and is adjacent to Rolland Collins' (6) property.

This property is located in mafic tuffs and flows that have been intruded by a subcircular intrusion of a granodiorite/quartz monzonite body. At the extreme eastern border, a metavolcanic-metasedimentary contact is outlined on Map 2429, back pocket.

WILLIAM Z. LANGRIDGE (14)

William Z. Langridge is currently the registered taxpayer for the only claims leased in the map-area. His group of claims is made up of eight contiguous surveyed claims numbered TB 41922, TB 41944, TB 41748 to TB 41749, TB 41751 to TB 41752, and TB 41769 to TB 41770, all inclusive and located 1.6 km south of the east end of Conglomerate Lake, just south of the Mine Road and west of the Con Lake Road. The claim group contains the old Kenty showing which was first reported by Gledhill (1925) and subsequently by L.F. Kindle (1931) and Moorhouse (1938). The history of the property is outlined from these reports and

other available unpublished reports in the Assessment Files Research Office, Ontario Geological Survey, Toronto; Files 63.324, 63.1155 and 63.1167.

History

Claim staking was at its height in the summer of 1923 and in the spring of 1924, and still continued during the summer of 1924 following the first gold discovery of any considerable size made in July 1922 by Brennan and partners (just outside the map-area) according to Gledhill (1925, p.70). The Kenty discovery was made on claims KK 800 and KK 831, because the gold belt extended westward along the South Branch (of the Onaman River), and it was the first important discovery made near the metasediments which lie south of Conglomerate Lake (Gledhill 1925, p.70 and 82). Trenching and channel sampling was conducted by the Kenty brothers. Due to other activities, however, they were unable to return to the property, and the advent of World War II brought an end to interest in gold leaving the property and surrounding area quiescent until the early 1950s when market conditions warranted a revival of interest. According to R. Massey Williams (1960, Assessment Files Research Office, Ontario Geological Survey, Toronto):

> In the winter of the year 1951 [February] these claims were restaked by Nakina prospectors, and turned over to Wm. Langridge, Jr. in the early summer (June) of 1951.

William Langridge, Jr. probably formed a company (Chontor Mining Corporation Limited) that conducted general surface work in the summer of 1951 and hired McPhar Geophysics Limited on contract to carry out line cutting and an electromagnetic survey in the winter of 1952. Three diamond-drill holes were recommended by this survey, but the holes were not drilled until the summer of 1955 when three holes totalling 419 m in length were collared on claims TB 41751 (Hole Number 1 - 235 m) and TB 41944 (Hole Number 2 - 42 m and Hole Number 3 - 92 m). Hole Number 1 was apparently in the vicinity of the old Kenty Showing and gave assays of 0.10, 0.02 and 0.02 ounce of gold per ton between 93.8 and 96.1 m, 107.6 and 109.4 m, and 109.4 to 111.7 m lengths. Holes Number 2 and Number 3 were drilled on McPhar anomalies, apparently with negative results.

In the summer of 1957, the claims were reported by R. Massey Williams (Assessment Files Research Office, Ontario Geological Survey, Toronto) to have been surveyed toward patent requirements, and 754 more man days of work were further required before patent requirements would be met. In 1960, R. Massey Williams suggested diamond drilling and combined geophysical (magnetometer) and geological mapping surveys to: 1) trace out the lateral and vertical continuity of the old Kenty Showing which were no longer exposed then; and 2) to complete the assessment requirements to bring the claims into patent status. By July 1960, the ground was known as "Chontor Claims or Option" and the property was owned by Norsco Mines Limited on option from Chontor Mining Corporation Limited. Between July and August, 1960 five diamond-drill holes totalling 325.3 m were collared for Norsco Mines Limited on claims TB 41752

(Hole Numbers 4, 5, and 6) and on TB 41748 (Hole Numbers 7 and 8) probably to meet patent requirements. These holes intersected zones of pyrite mineralization in banded altered lavas (units 1ab Map 2429, back pocket) with porphyry intrusions apparently without any observed gold mineralization.

In 1962 Jorsco Explorations Limited apparently obtained an option from Chontor Mining Corporation Limited and staked nine unsurveyed claims to tie into the east and west boundaries of the option. In March 1962, a magnetometer survey was conducted on the west nine claims (S.S. Szetu 1962, File 63.1155, Assessment Files Research Office, Ontario Geological Survey, Toronto) and in April-May, 1962, a magnetometer survey was conducted on part of the Chontor Mines option (claims TB 41769 and 41770) and on the adjoining eastern group of nine unsurveyed claims (S.S. Szetu, 1962, Assessment Files Research Office, File 63.1167). Two narrow magnetic bands were outlined in the eastern group of the claims, and several magnetic zones were defined in the western group. Six hundred metres of exploration drilling was recommended after the surveys, and four holes totalling 656 m were collared on claims TB 99950, TB 99944, and TB 99953 between June-July, 1962 (R. Massey Williams, 1962, Assessment Files Research Office, Diamond Drill Report No. 12, Ontario Geological Survey, Toronto). Trace to nil values of gold were returned in pyrite mineralized sections in altered and carbonatized lavas.

No recorded exploration work is available after 1962 and the old workings are now unexposed because of logging operations. It is unknown when William Z. Langridge acquired the ground.

General Geology

Because of the scarcity of outcrop in this part of the map-area, it is difficult to present a reasonably complete description. From data in Gledhill (1925, p.80), Moorhouse (1938, p.20), and Kindle (1931), the core logs and available outcrops in the vicinity of the property, the ground is perceived to be underlain by massive, altered, and recrystallized mafic flows and tuffs (see Figure 8, p.72 of Gledhill 1925). These rocks are cut by lenticular porphyry intrusions that are associated with, and probably cause intense silicification, carbonatization, and shearing of the metavolcanics. A body of a subcircular granodiorite to quartz monzonite intrusion invades the metavolcanic country rocks in the eastern part of the map-area.

Nature of Mineralization

The gold-molybdenite mineralization in this property had been reported previously only by Gledhill (1925, p.82) who apparently made a visit to the workings when they were exposed. His description of the mineralization is included:

> The mineralized zone extends east and west with the schistosity strike. The dip is nearly vertical. Recrystallized greenstone bounds the mineral zone on the north; on the south, the mineralization can be traced to where the rock is covered by muskeg. The mineralization was no doubt produced from solutions coming from the granite.

Some quartz veins up to three feet [0.9 m] in width lie on the north side of the mineralized belt. Channel samples taken by J. Kenty across 8 to 10 feet [2.4 to 3 m] of mineralized schist carried values ranging from $4 to $14 in gold per ton. Gold pannings were made by the writer in several places on the discovery. Portions of the schist are silicified. Pyrite, molybdenite, and gold appear to be the only ore minerals. Claims lying east and west of Kenty's discovery have mineralized schist which gives gold assays. This part of the camp has an overburden of glacial drift which makes prospecting somewhat difficult.

Only minor to trace gold values were reported in pyritiferous zones that were intersected by all the diamond drilling programme of the property.

LYNX-CANADA-DEJOUR-CANADIAN REYNOLDS SYNDICATE (15)

A group of 25 contiguous, unsurveyed mining claims are registered to Lynx-Canada-Dejour-Canadian Reynolds Syndicate in the northeast corner of the map-area. These claims are numbered TB 383673 to TB 383684, TB 383501 to TB 383507 and TB 434732 to TB 434735 all inclusive, and form the southwestern part of a large block of claims which were acquired by a syndicate composed of Lynx-Canada Explorations Limited, Dejour Mines Limited, and Canadian Reynolds Metals Company Limited by option in July 1975 from Coulee Lead and Zinc Mines Limited, Headway Red Lake Gold Mines Limited, and Carndesson Mines Limited (Thurston 1976, p.90). The ground in the map-area has been investigated by the exploration surveys of Noranda Exploration Company Limited in 1973, Palomino Explorations Limited in 1967, and American Metal Company of Canada in 1948. The 1967 and 1948 surveys were conducted entirely in the map-area, but the 1973 survey by Noranda Exploration Company Limited and the subsequent surveys by the syndicate led by Lynx-Canada Explorations Limited were directed towards the Headway Red Lake Gold Mines Limited and Coulee Lead Zinc Mines Limited Prospects located only within about 3 km north of the northeast corner of the map-area where a small tonnage deposit (250 600 tons) of 1.32 ounces per ton silver and 4.44 percent zinc has been outlined (Thurston, 1976, p.52).

History

The history of the staking, ownership, and exploration surveys to the north of the map-area, around the small tonnage base metal prospects is described in detail by Thurston (1976, p.58, 59, p.86 to 87, and p.90 to 92).

The northeast part of the map-area held by Lynx-Canada Explorations Limited was covered by the American Metal Company of Canada Limited's geophysical survey which was conducted in 1947-1948. This company allowed the claims to lapse without performing any additional work.

In 1967, a part of this area was tested by magnetometer and electromagnetometer surveys of Palomino Explorations Limited which resulted in 150 m of diamond drilling and an outline of Palomino Explorations Occurrence (see "Rolland Collins, (6)"), which is a massive pyrite-pyrrhotite deposit being made. This deposit was tested by two diamond-drill holes totalling 306.9 m (File 63.2242, As-

sessment Files Research Office, Ontario Geological Survey, Toronto).

Between 1971 and 1973, Noranda Exploration Company Limited acquired claims in this area. Following geochemical, geological, magnetic, and electromagnetic surveys, the massive pyrite-pyrrhotite deposit was outlined and tested at depth (just outside the map-area) by two holes which totalled over 180 m in length. A wide pyrite-pyrrhotite intersection, (wider than recorded in the Palomino Explorations Limited drilling), over 20 m in length, was intersected by both of the holes (Thurston 1976, p.87; File 63.3051, Assessment Files Research Office, Ontario Geological Survey, Toronto).

During the 1976 field season, the Lynx-Canada-Dejour-Canadian Reynolds Syndicate continued geochemical, geological, and geophysical surveys on the claim group and diamond drilling was anticipated in the winter for the Conglomerate Lake map-area and the adjoining area. During the field season, a new zone of copper-zinc-silver mineralization was uncovered by trenching. This zone is 2.5 km outside the map-area. Another new showing of molybdenite mineralization was also exposed by trenching 3 km outside the map-area in a narrow breccia unit.

General Geology

Outcrop in the area is sparse. The eastern quarter of the property is underlain by the West Onaman Lake Batholith. The western part is underlain by outcrops of pillowed flows that are variably foliated and trend approximately due north. Although no outcrops of felsic pyroclastic rocks were mapped in the current map-area, Thurston (1976) reported a narrow unit of felsic metavolcanics trending northeast and extending up to a point only 300-400 m north of the map-area. Other similar outcrops were mapped by Thurston (1976) 300-400 m east of the northeast boundary. The felsic metavolcanic unit could probably extend into this part of the map underneath the extensive sand and clay deposits.

Mineral Deposits

The Palomino Explorations – Noranda Exploration Company pyrite-pyrrhotite occurrences are described elsewhere in the report. The nature of sulphide mineralization of the Headway–Coulee lead-zinc-silver prospects and Lynx-Canada-Dejour-Canadian Reynolds Syndicate copper-silver-gold prospects are described in detail by Thurston (1976):

> In essence, Hole 67-2 (500 feet deep or 150 m) was collared on claim TB 133099 [Lynx-Canada Explorations Limited, Claim TB 383504 or 383509] in November 1967 by Palomino Explorations Limited to test Anomaly "B" defined by electromagnetometer and magnetometer surveys. It intersected gabbroic material [1w or 1j] which was cut by a major shear zone between 228-265 feet [69.5 to 80.8 m] wide. Hole 67-2 (507 feet deep; 154.5 m) drilled on claim TB 133087 [now TB 418525], is not included in this property but borders it, intersected 24 feet [7.3 m] of massive pyrrhotite which returned an average of 36.4 percent sulphur and 41.6 percent soluble iron in metasediments.

The diamond-drilling of Noranda Explorations Limited indicated a north-

striking band of sulphide facies iron formation interbanded with felsic metavolcanics in the same general area (but outside the map-area) as much as 24 m wide which contained pyrite, pyrrhotite (trace sphalerite and chalcopyrite), (File 63.3051, Assessment Files Research Office, Ontario Geological Survey, Toronto).

PETER J. NABIGON (16)

Twenty contiguous unpatented claims numbered TB 383523 to TB 383542 inclusive are located to the east of Con Creek astride the Con Lake Road, and are registered in the name of Peter J. Nabigon of Downsview.

No work is reported by the current owner, but some of the ground covered by his claims were investigated by exploration surveys of: 1) Rouandah Gold and Metals Limited (1952), (claims TB 383541 to TB 383542 inclusive, and TB 383525) in which no deposit was defined, see also Rolland Collins (6), and 2) New Bidlamaque Gold Mines Limited (claims TB 383531 to TB 38352 and TB 383537 to TB 383538 inclusive) who in 1959 outlined narrow intersections of pyrite-pyrrhotite (trace chalcopyrite and sphalerite) in six diamond drill holes totalling 632.02 m in length, see also Nolan Cox (9).

This property is underlain by a metaconglomerate-metasandstone unit where it trends almost north-south. The eastern and northeastern parts of the property are underlain by outcrops of altered pillowed flows and associated tuffs. The contact between the metasediments and metavolcanics is interpreted to run through the property, but the interpretation is based on a limited number of outcrops.

J. THOMAS NEELANDS (17)

J. Thomas Neelands of North Bay is the registered owner of claims TB 418525 to TB 418528 inclusive. These claims are unsurveyed and unpatented contiguous mining claims located astride the bridge across the Mine Road near the northern border of the map-area.

One of these claims (TB 418525) covers the ground which forms the Rolland Collins (6) property which was outlined by Palomino Explorations Limited between July 19 and October 2, 1967 by ground electromagnetometer and magnetometer surveys, to follow up an airborne magnetic electromagnetic survey (G.L. Kirwan, 1967; File 63.2242, Assessment Files Research Office, Ontario Geological Survey, Toronto). The work was conducted on a 20 claim group (approximately 320 ha) numbered TB 133086 to TB 133105 inclusive and covered all of the four claims of this property.

Two major conductive zones numbered "A" and "B" were outlined on the J. Thomas Neelands (17) and the Lynx-Canada-Dejour-Canadian Reynolds Syndicate (15) properties respectively. Diamond-drill hole Number 67-1 (154 m in length), located on claim TB 133087 (now TB 418525), investigated conductive zone "A" at depth, and intersected massive pyrrhotite from 61.3 to 68.6 m. A 7.3 m section representing a core width of the sulphide material was split in 15 m

sections which returned an average of 36.4 percent sulphur and 41.6 percent iron. The massive sulphide mineralization is in the metasediments (probably a metaconglomerate, see Map 2429, back pocket, and Thurston 1976).

Diamond-drilling by Noranda Explorations Limited only about 60 m east of the metaconglomerate outcrop reported by Thurston (1976) also indicated a massive sulphide iron formation up to 24 m thick interbanded with felsic metavolcanics which contained pyrite, pyrrhotite, and trace sphalerite and chalcopyrite in which pyrite-pyrrhotite was in a ratio of 3:2 (File 63.3051 Assessment Files Research Office, Ontario Geological Survey, Toronto).

The only outcrops observed in this property are the two outcrops of a matrix-supported, polymictic pebble conglomerate just outside the map-area (Thurston 1976). These outcrops were examined by the author in 1971-1972, but could not be relocated during the field season because of logging operations which occurred after 1972.

DAVID THORSTEINSON (18)

A total of 14 unsurveyed claims that cover the Con Creek Showing (see "Nolan Cox (9)") are registered to David Thorsteinson of Beardmore. The claims cover the ground that was investigated by New Bidlamaque Gold Mines Limited in 1959-1960 and by Shawmin Explorations Limited in 1973.

The history, general geology, and mineral deposits of this property are as described for the Nolan Cox (9) property.

It is known that the ownership of both properties of Nolan Cox (9) and David Thorsteinson (18) were being legally disputed in courts at the time of the current survey.

JOSEPH THORSTEINSON (19)

Joseph Thorsteinson of Beardmore is the registered owner of nine contiguous unpatented mining claims numbered TB 386234 to TB 386242 inclusive, and which are located to the west of Con Lake, just south of the Con Creek Showing.

No record of exploration work has been reported, but the ground was probably staked to procure a possible southern extension of the Con Creek Showing (Nolan Cox (9)) and to cover a possible western extension of the property of Paul Carignan (5).

The property lies in an area underlain by pillowed mafic flows (Unit 1ah, Map 2429, back pocket). To the west of the property, the metasedimentary unit terminates, and to the east, the mafic lavas are intruded by a tongue of the Onaman Stock (Thurston 1976).

JURIS ZDANOVSKIS (20)

Nine contiguous unpatented claims registered to Juris Zdanovskis of Thunder Bay are located to the east of Hindson Lake, south of Crooked Green Creek. The claims are numbered TB 444547 to TB 444555 inclusive, and were probably staked in the Pinel Creek Intrusion extension into this area to cover a possible northern extension of the Jacobus Copper Nickel Prospect (Chesterville Mines Prospect) (12). The property is largely sand covered, but a few diorite outcrops of the Pinel Creek Intrusion were mapped.

POTENTIAL FOR FUTURE MINERAL EXPLORATION

The Conglomerate Lake map-area and the surrounding country is well situated with regard to transportation and mining facilities. It is easily accessible by means of a number of all-weather access roads from the northern route of the Trans-Canada Highway, and is located close to the Canadian National Railway line to Thunder Bay, a southern branch off the transcontinental line. The centre of the area is approximately 26 km due north of the Ontario Hydro-electric Power Commission powerlines, and the 30-inch diameter line of the Trans-Canada Natural Gas Pipeline Company.

Specific favourable geological environments suggested for future consideration in the map-area are:

1) The possibility of economic syngenetic exhalative copper-silver-gold occurrences associated with mafic metavolcanics. The author concurs with Thurston (1976, p.93) in recommending an investigation of the so-called "formational" or stratiform conductors in the mafic metavolcanics.

2) Geological features associated with syngenetic sulphide mineralization in metavolcanics, such as coarse pyroclastic rocks and features of undisputable fumarolic origin, can be used to explore for the massive sulphides. Rocks of this type are located in the southern and northeastern parts of the map-area.

3) The association between sphalerite-galena-chalcopyrite-silver mineralization and highly sheared, sericitized, and sometimes carbonatized north-trending quartz and/or feldspar porphyry dikes is readily apparent in the northeast part of the map-area as previously discussed under "Metavolcanics". Recognition of additional porphyry dikes in these areas may provide a prospecting quide for future exploration surveys.

4) The Crooked Green Lake and Con Creek gabbroic-dioritic intrusions are similar in composition, texture, mode of occurrence, and origin to the Pinel Creek Intrusion and should be investigated for possible copper-nickel mineralization. Two grab samples (Numbers 22, 23, Table 16) collected by the author from a quartz vein containing chalcopyrite and pyrite mineralization in the Crooked Green Lake Intrusion located to the east of Crooked Green Lake returned assays of 1.32 and 0.62 percent copper and trace amounts of nickel and lead (Assays by Geoscience Lab-

oratories, Ontario Geological Survey). The Crooked Green Lake Intrusion is also well outlined by strong aeromagnetic highs between 60 500 and 61 100 gammas (ODM-GSC 1963).

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